How I Did It – by BILL ODOM

FLYING

JUNE 1949 • 25 CENTS

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E JET FIGHTERS VERRATED?

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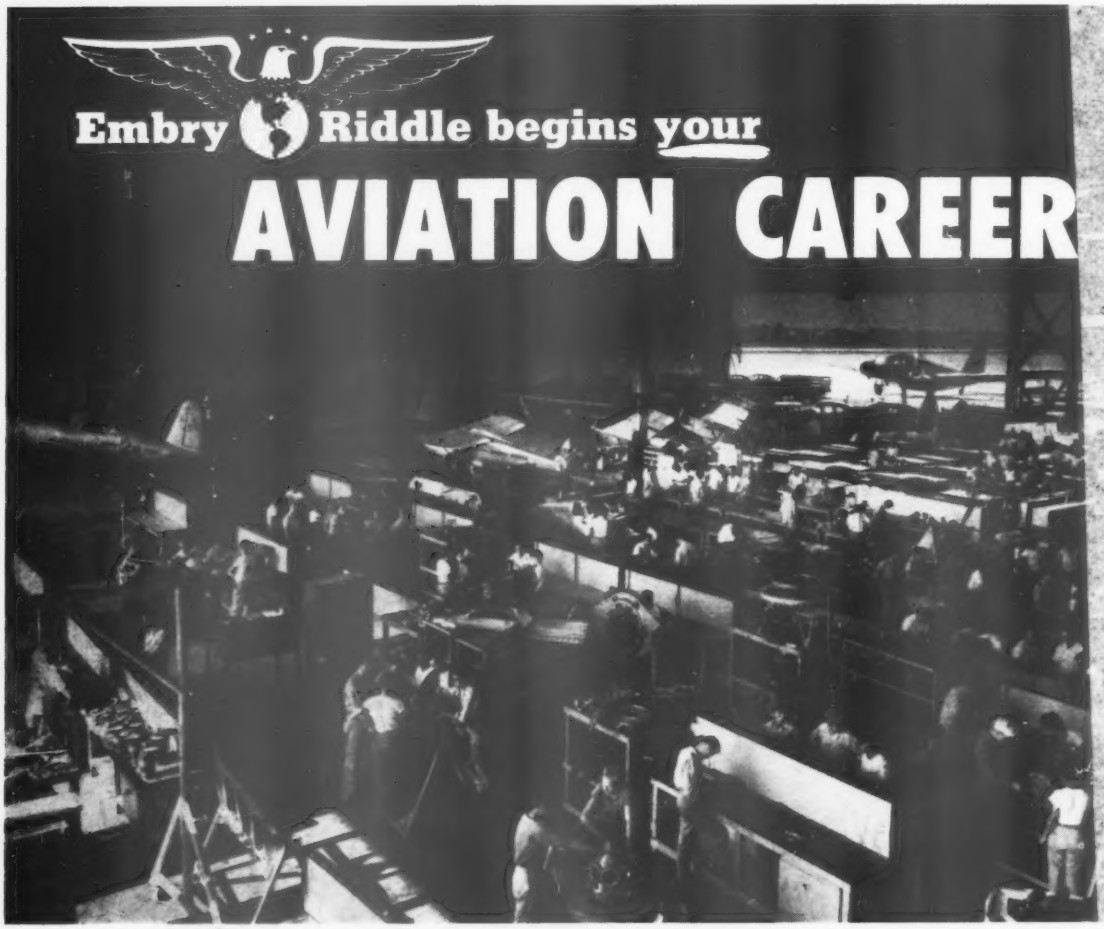

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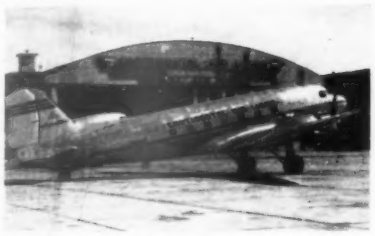
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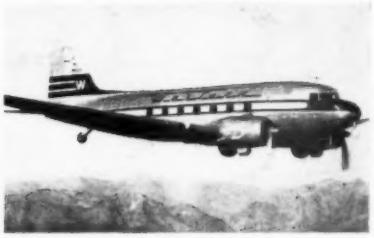
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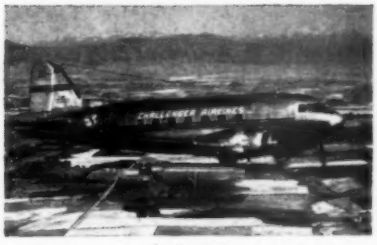
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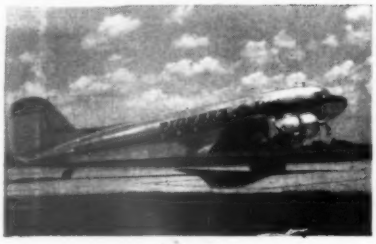
Pioneer

United

Trans Texas

12 airlines switch 246 DC-3's to B.F. Goodrich brakes

THE twelve airlines shown above operate fleets of 5 to 75 Douglas DC-3's. Together they have 246—all equipped with B. F. Goodrich brakes.

Most of these DC-3's had other makes of brakes as original equipment. The switch to B. F. Goodrich Expander Tube brakes naturally cost money. But to economy-minded airlines, this initial expense was more than made up for by substantial savings through lower maintenance costs on B. F. Goodrich brakes.

The simple design of the B. F. Goodrich Expander Tube brake makes maintenance easy, reduces "in-shop" time. The only tools needed to reline it are a screwdriver and pliers. Because the expander tube applies pressure directly to the brake blocks, extra parts and linkages are eliminated. And because the braking action covers a *full circle*, wear is slower and spread more evenly. Replacement costs are cut.

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THE COVER: McDonnell XF-88, powered by twin turbo-jets, is new Air Force fighter.

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FOR TOP-FLIGHT SERVICE . . .

Big Spring Municipal Airport, Texas

★

Some of the Big Spring Airport Personnel. Airport Manager, Robert J. Cook (left) spent two years as Army Instructor and three years as captain in the ATC, flying C-54 cargo planes "over the Hump".

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BIRDS of a feather flock together! The best recommendation for high-quality Phillips *66* Aviation Products is a list of the high-ranking airports which use them!

Big Spring Municipal Airport, where dependable Phillips *66* Aviation Products are in daily demand, is well equipped with four paved runways, each well over a mile in length. The entire field is lighted with runway contact beacon, flood and construction lights. 24-hour CAA Tower, CAA Communications service and U. S. Weather Bureau Service are all located on the field. A licensed A and E Mechanics Shop provides repair facilities.

When you are charting your next flight over this territory, plan to stop at Big Spring for refueling with dependable Phillips *66* Aviation Gasoline. You'll find ample hangar space for overnight stays, or for longer periods. The Aviation Dept., Phillips Petroleum Co., Bartlesville, Okla.

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THE MAIL BOX

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Tail high and nose down . . .

One pilot [with 18 years flying experience] listened, open-mouthed, and only after he noticed the air speed maximum was 140 m.p.h., did he realize someone was pulling his leg.

Looks like we're getting back to where we were in 1933 and 1934. We didn't make much money, but we sure had fun.

WILTON R. PROBERT
Vice President
Probert-Devine Aviation Corp.
Pacoima, Calif.

MORE ON SHERIDAN

Hy Sheridan's "Logging Time" . . . is the first thing I look for.

So far I have found only one thing wrong with it—it isn't long enough . . .

MARTIN SCHEBERLE
Amarillo, Tex.

I am one of those sour faces who never laughs. It takes a good comedian to make me crack a smile. When the radio is tuned to . . . corny radio comedians I leave the room because the family complains I have no sense of humor.

But when I read your "Logging Time" I can't help but bust out laughing now and then. "The Pilot Takes a Physical" [February, FLYING] is a masterpiece . . .

CONWAY BIRD
Youngstown, O.

● Author Sheridan says: "There is nothing . . . that so warms the cackles of a humorist's heart as to have someone . . . tell him that his efforts go pop instead of pud . . ."—ED.

RAINBOW LODGE AIRPORT

Your article on the "Colorado River Country," [April FLYING] is well done . . . but you forgot to mention that Rainbow Lodge has had an airport for the past 12 years.

Pilots land uphill to the west and take off downhill to the east on a 2,200-foot runway.

The airport is at the southeast end of Navajo Mountain, right on the road, three miles east of the lodge.

BARRY GOLDWATER
Phoenix, Ariz.

ANOTHER VETERAN

After reading about Linda Cook who logged 50 hours before she was seven months old, [February FLYING], I feel that my young daughter, Ponda Ann, is being slighted.

Before she was five months old, Ponda flew 10,000 miles with us [in a Stinson *Station Wagon*] from Atlanta, Ga., to this city which is about 400 miles south of Rio de Janeiro.

At that time [November 20, 1947], Ponda undoubtedly had more flying time [103 flying hours] than any other child of her age in the world . . .

EARL ELLIS GARRARD
Curitiba, Parana
Brazil

CHECK PILOT

. . . What has become of Max Karant's check pilot articles?

D. J. B. LETHBRIDGE
Weybridge, Surrey
England

. . . One of your most popular departments is the appraisal of new private planes. Have you discontinued this feature?

ROY PELLETIER
Williams, Ariz.

● The FLYING Check Pilot series is resumed in this issue (page 38) with Ben Robin's report on the new four-place Piper *Clipper*.—ED.

DESIGNATION LETTERS

On page 46 [March FLYING] you state that the Martin *Mauler* is from the U.S.S. *Kearsarge*. Planes from this carrier would

What does the letter R mean?

have a large K on the rudder. The R on the Mauler's tail would indicate that it is from another carrier . . .

HOWARD W. SMELTZER
Greensburg, Pa.

● The letter on the rudder designates the air group and not the carrier from which the plane operates. Under the old system of marking there were two letters—the first for the ship and the second for the air group. Now a single letter designates the air group only.—ED.

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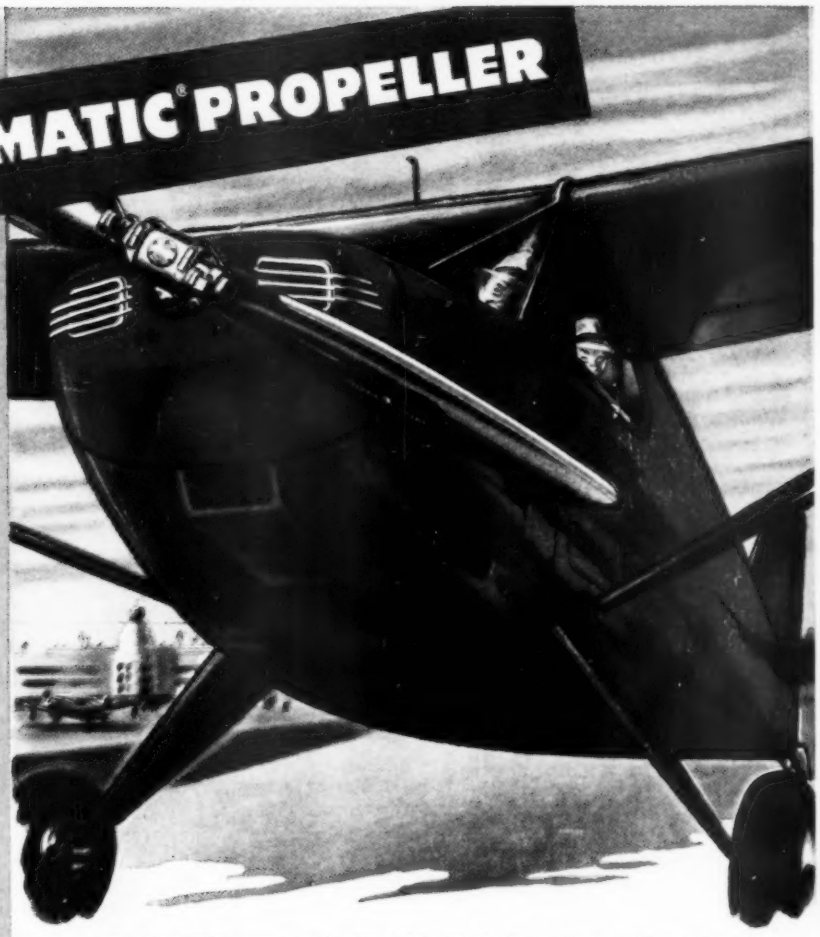

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NOTES ON CIVIL FLYING

. . . **The number of U.S. civil aircraft** on January 1, 1949 was 95,997, compared to 94,821 on January 1, 1948. This was an increase of 1,176. California led all states with 10,741 planes, followed by Texas with 7,856, and New York with 4,661.

. . . **Piper Aircraft Corporation** is doubling production of its four-passenger *Clipper* (see page 38) from four to eight per day.

. . . **Joe De Bona** set a new cross-country record when he flew a North American F-51 from Burbank, Calif., to La Guardia Field in 5 hr. 5 sec. on March 29. He beat the former record held by Paul Mantz by 1 hr. 7 min. He averaged 491 m.p.h.

. . . **Colonial Airlines** has entered its 20th year of scheduled operations without a fatality or serious injury to pilot or crew member.

. . . **Massachusetts laws** now permit the state's aeronautical inspectors to arrest violators of the state's aviation laws. They did not previously have this authority.

. . . **RCA engineers** are using helium-filled balloons, carrying transmitters and antenna, to select sites for television transmitters.

. . . **Aviation is overcrowded** as a result of thousands of war-trained veterans competing for existing jobs, the Bureau of Labor Statistics has concluded in a 454-page Occupational Outlook Handbook prepared for the Veterans Administration. The study sees gloomy employment prospects for pilots, radio operators, navigators, dispatchers and flight engineers. Somewhat better prospects are seen for airport and air route traffic controllers, and stewards and stewardesses. The prospects for airplane mechanics are looking up and hiring is expected soon to be sufficiently heavy to cut down considerably or wipe out the surplus of applicants.

. . . **A slide rule for mechanics,** designed by Fred D. Jones, director of training for Arlington Aeronautical School, is now being marketed.

. . . **Douglas Aircraft Company** is suing Canadair Limited for $1,400,000 for alleged violations of a contract between the two companies under which Canadair was licensed to manufacture four-engined transports of Douglas design.

. . . **ICAO** has taken a major step to simplify international air travel with adoption by its council of a simplified set of customs, immigration and related regulations. The rules standardize and simplify international entry forms though they must still be approved by a majority of ICAO's 51 member nations.

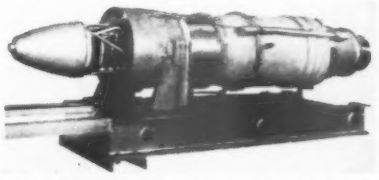
. . . **Adm. DeWitt C. Ramsey,** retiring commander in chief of the Pacific Fleet, U.S. Navy, has been elected president of the Aircraft Industries Association.

. . . **Twelve of the 15** major aircraft companies reporting up to April 1 had 1948 aircraft sales totalling $1,012,360,000 and net profits of $13,894,000.

. . . **DeHavilland Aircraft and Engine** companies have announced a jet airliner, the *Comet* (D.H.-106), which is expected to fly this year. Sixteen of the planes are being built. They will fly at about 40,000 feet, carry a crew of four and up to 36 passengers. The plane will be powered by four *Ghost* turbojets with a static thrust of 5,000 pounds and is expected to cruise at around 500 m.p.h.

. . . **H. I. Thompson Company** of Los Angeles is pre-fabricating Fiberglas insulation kits to fit various makes of personal and executive type aircraft.

. . . **A small turbo-jet** engine capable of producing 770 pounds of thrust at take-off and 700 pounds at cruising speed is now in production for USAF pilotless aircraft. The baby jet is six feet long



and about as big as a stove pipe. It is capable of propelling a medium-weight executive plane 250 m.p.h., though no civil designs are underway to make use of this engine at present. It is manufactured by Frederic Flader, Inc., North Tonawanda, N. Y.

. . . **When is a buzz job** not a buzz job? Certainly not when landing or taking off in a city, a justice court in Wisconsin Rapids, Wis., decided last February. When Kenneth O. Thompson landed his Aeronca on the frozen surface of the Wisconsin River, he was hailed into court on a charge of low and reckless flying. Justice Donald E. Reiland decided that Wisconsin statutes didn't apply to airplanes when they were landing or taking off.

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America's most brilliant electronic engineers acclaim Moving Target Indicator to be as important a development as GCA* itself. As GCA penetrates fog, rain and snow to record *all* targets, so MTI penetrates and wipes out all ground clutter from the surveillance scope to show only *moving* targets.

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MILITARY NEWS

. . . **The private papers** of Brig. Gen. William (Billy) Mitchell, Air Force pioneer and air power prophet who died in 1936, have been placed in the Library of Congress by his widow and two children. The Mitchell papers include letters, diaries, newspaper clippings, photographs, and manuscripts.

. . . **Doctors and dentists** are needed by the U.S. armed forces. By the end of July, there will be military shortages of about 1,600 physicians and 1,160 dentists. By December, the shortage will have increased to 2,200 physicians and 1,400 dentists. The National Military Establishment is conducting a vigorous campaign to obtain the required number of medical specialists without recourse to Selective Service.

. . . **Helicopter speed record** of 133.9 m.p.h. was set recently by the Bell XH-

12, an Air Force craft. The five-passenger all-metal craft was clocked on two level runs over a 5,500-foot east-west runway at Niagara Falls, N. Y., airport.

. . . **Unit commanders** of Air National Guard units from 48 states, the District of Columbia, Puerto Rico and Hawaii recently attended a three-day meeting at Orlando, Fla. The 500 officers participating in the meeting discussed the Air Guard's role in a possible M-Day mission.

. . . **Twenty-five per cent** of the Republic F-84 (*Thunderjet*) fighters now used by the Air Force will be transferred in the near future to Wisconsin, New Mexico and Kansas units of the Air National Guard. Other Air Guard units will be re-equipped with modern jet fighters as rapidly as production schedules permit.

. . . **Air Force health records** toppled in 1948, the "healthiest" year in the air arm's history. Maj. Gen. Malcolm C. Grow, Air Surgeon, said that the present low record of hospitalization can be maintained only with adequate numbers of medical officers. He placed emphasis upon health education and preventive medicine programs conducted by medical officers attached to units.

. . . **The "Zero Reader,"** Sperry's new navigating and landing aid, is being tested by the Air Force. The device has a simple two-element indicator which tells pilots precisely how to move the controls to steer right or left or to go up or down. The Zero Reader combines cockpit information ordinarily supplied by the Gyro-Horizon, Directional Gyro, Magnetic or Gyrosyn Compass, sensitive altimeter, and the instrument landing system cross-pointer meter.

. . . **Over 3,200 college seniors** received Reserve Air ROTC commissions at approximately 100 colleges and universities this June. These officers will have an opportunity to serve for three years on active duty with the Air Force. Those who can pass the physical and aptitude examinations will be accepted for pilot training.

. . . **Rocket power plant** for the Air Force's new X-2, successor to the X-1, first plane to exceed the speed of sound, is in final stages of development by Curtiss-Wright's propeller division.

. . . **The DeHavilland Vampire,** British jet fighter, will be built under license in France. Several western European countries have adopted the *Vampire* as a high-altitude interceptor, ground-attack aircraft and general fighter for their air forces. The *Vampire* was the first jet to land on and take off from an aircraft carrier at sea.

. . . **Air Force Association's** 1949 annual convention will be held in Chicago July 1-2-3, with headquarters at the Hotel Stevens.

. . . **All the planes** ordered this year by the armed forces represent less than two weeks' output of the aircraft industry at peak war capacity, according to the Aircraft Industries Association.

. . . **First flight** of Northrop X-4, newest Air Force research plane, lasted 17 minutes. Powered by gas turbines, the X-4 is capable of flights of longer duration than rocket-powered planes such as the X-1.

. . . **Naval Commands** will promote model airplane building by youngsters and will provide facilities for model clubs and groups. The 18th National Model Airplane Meet, scheduled for July 26-31, will be held at Naval Air Station, Olathe, Kan.

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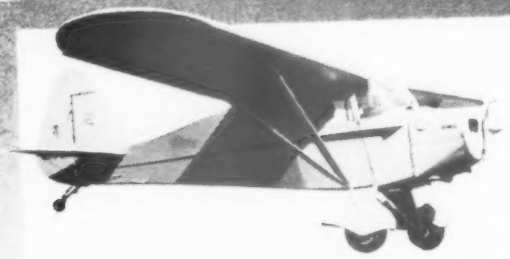
PIPER STINSON. In the 1949 Piper Stinson, the two finest names in personal aviation are joined to assure the ultimate in performance and comfort at moderate price. Wonderful flight characteristics explain why Stinson has outsold all other 4-place aircraft.



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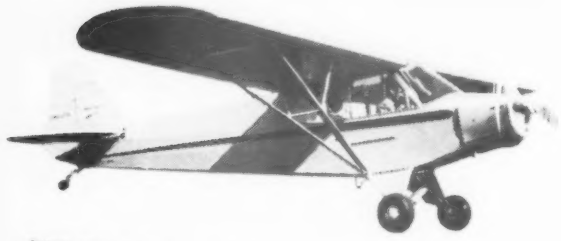

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From the economical Vagabond to the luxurious Stinson, there's a Piper plane to meet every purpose in airport operations or private flying. And behind every Piper aircraft is 18 years of leadership in building over 30,000 aircraft — positive assurance that your 1949 Piper has the time-proven features of rugged construction, ideal flight characteristics, long life and easy serviceability.

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LOCK HAVEN, PENNSYLVANIA

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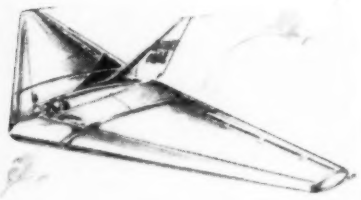
GOOD PAY FROM THE START

Northrop-trained men have drawn top pay brackets for starting jobs in *Aeronautical Engineering*. They have an enviable record for moving up fast, in both earnings and responsibility. Join them—by getting Northrop training—and gain this important advantage in starting YOUR career. Many types of *creative* duties mean there can be a place for you if you possess *imagination* and *originality*. Many *practical* kinds of work mean there can be a place for you if you like *action* and the *use of skill*.

In a huddle on their design for the rudder of a student project aircraft, these Northrop students study their assembly drawings—a scene they will repeat many times during their careers.

Wing-top classroom—an example of how engineering instruction at Northrop comes vividly to life in an actual aviation industry environment.



All-wing glider designed by Northrop engineering students—a typical training project for practical design and production experience.

NORTHROP TRAINING HAS WON CHOICE JOBS FOR GRADUATES

Many of even the more recent *Northrop* graduates are in such important specialized work as design, research, testing, stress analysis, aerodynamics, and power plant engineering. Helicopter and guided missile design are examples of the advanced projects for which *Northrop* graduates have been chosen.

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What Price Arabian Oil?

AMERICA is air-minded.

It stands to reason that a nation which produced the Wright brothers and the wholesome freedoms for invention, initiative and enterprise which enabled them to give to mankind the boon of aviation should be the leader in aviation development.

For centuries it has been said that the nation which controlled the seas controlled the world. That saying no longer holds water. Today, the nation which maintains supremacy in the air holds the dominant position in the world.

America today holds that position. It is a position of honor. It is equally a position of responsibility to see that we always maintain our air power for the benefit and freedom of mankind.

Many ingredients are essential to obtaining and maintaining supremacy in the air. Among them is a strong national economy providing a constant evolution in industrial achievement, a strong fiscal policy, a fair and square attitude toward all nations and, above all, preservation of the republican freedoms under which the United States of America has become the lighthouse of liberty for freedom-loving peoples everywhere.

We cannot be strong and continue to be the bulwark of freedom if America pursues short-sighted policies that neglect our national resources and fritter them away to the point where we would, as a nation, become impotent in the event of a national emergency.

By Sen. KENNETH S. WHERRY

A Nebraska Republican, Sen. Wherry has been a member of the United States Senate since 1942. He was named Republican Whip in 1944, and since January has served as Republican Floor Leader.

To readers of FLYING, it is unnecessary to labor the fact that oil is the lifeblood of aviation.

During the recent war we had a demonstration of the military need for oil which should be seared into the minds of our national policy makers. It behooves us to look to our resources in oil and to take a look at the possibilities for oil development in the Middle East and elsewhere that oil might be supplied in the event of a national emergency

We are asked: "What price Arabian oil?"

In August, 1944, Germany had its back to the wall. Days and nights, thousands of American heavy bombers, accompanied by fighter escorts, battered (*Continued on page* 74)

WHAT IS PRIVATE FLYING'S Biggest Problem?

Operators, pilots and Government officials disagree with plane builders on the diagnosis and cure of private flying's ailments.

FEDERAL GOVERNMENT

Hugh L. Dryden, Director of Research, NACA

NO ONE PROBLEM . . .

NO ONE problem can be labeled "private flying's biggest single problem." In a technology as complex as aviation, the problems confronting continued advancement are so interdependent and interwoven that the solution to any one would not provide major advances. The two most significant needs, however, are greater utility and reduction in cost.

Even narrowing the field in this manner, one finds that many factors are involved in achieving these aims. An increased number of airports located not adjacent to but in populated areas would greatly increase the usefulness of the airplane to the average citizen. This requires a high level of safety of operation and a tolerable degree of noise. Airport development of this type would be facilitated by decreases in landing and take-off speeds without undue penalty on cruising speed.

Major reductions in cost will result only when there is sufficient demand to permit mass production of small aircraft.

Progress is being made in all aspects of private flying. However, advances probably will be evolutionary.

Dean R. Brimhall
CAA Research Expert

LACK OF UTILITY . . .

THE biggest problem confronting private flying is the lack of utility of the personal plane. Flying around an airport on Sundays, weather permitting, may be fun, but there just aren't enough people interested in that kind of flying to keep an industry going. This condition is reflected in CAA figures which show that personal and business flying during 1946 and 1947 averaged less than two hours per plane per week.

There are of course many other reasons, but our most important need is for a dual-purpose plane that can be used in short every-day trips.

A large untapped market awaits a useful personal plane. Over 4,500,000 families had incomes of over $6,000 in 1947. Given the proper vehicle, such people are potential customers.

Contrast this potential with the 86,000 aircraft in use in 1947, half of which were owned by persons in the aviation industry. Sixty-three per cent of the flying in all private aircraft was for instruction.

Private flying can only be revived by the production of a basically useful airplane. It is primarily up to the manufacturer to get such production going.

D. W. Rentzel, Admin. of Civil Aeronautics

VICIOUS CIRCLE . . .

LACK of utility is private flying's biggest problem. Yet it is impossible to narrow the problem arbitrarily to this one item.

Today as yesterday we are confronted with the same vicious circle that always has plagued private flying. Planes are made in small numbers, which makes them expensive, which limits ownership, which results in small production.

The only point in this circle at which the problem can be attacked is through greater utility. At this point we must depend on the habit of Americans to buy that which is useful.

We can, of course, take some pride in the fact that many business firms now are using airplanes for executive travel, and some satisfaction that many farmers are using planes. However, these two markets, even if saturated, will never produce an industry.

To be useful, the personal plane must land and take off in a space of about two acres regardless of wind direction; it must fly and land under complete control slower than 25 m.p.h. It must be roadable. With such a plane we could go anywhere.

Fred B. Lee, Deputy Administrator, CAA

HIGH COST . . .

I SUSPECT that high cost is a greater deterrent to general flying than anything else.

While the youthful enthusiast can talk himself around the obstacle of inconvenience, or shut his eyes to the sacrifices he must make in other departments of his life, in order to fly, he cannot avoid paying the bill.

In the case of young people from 19 to 30 who represent the largest group of private pilots, we know what their income is. We know also that many will spend all their available money to fly, join clubs to reduce the cost, work at an airport to pay for time—do almost anything because they love to fly. But most of these enthusiasts cannot afford to fly.

In the older groups, which usually have more money, the element of fear must be considered. However, our steadily improving safety record makes headway against this obstacle.

The solution is first an airplane that costs less to purchase; one that can be kept at home and not at a distant field; and a general reduction of the costs of maintenance by better design, reduction of regulations, or by making possible maintenance by the owner.

PRIVATE FLYING'S phenomenal progress in the past three decades has been overshadowed recently by a sharp slump in the personal plane market. Why? Aviation diagnosticians have huddled over the depressed patient for months, offering quick cures, new drugs, quack remedies. The doctors have disagreed in their diagnoses.

This month, for the first time, FLYING conducts a clinical examination of what ails private flying. The specialists—20 nationally-known aviation figures among private pilots, the industry, Government and fixed-base operators—are asked: "What is private flying's biggest problem?"

Barring the unlikely sudden development of a completely revolutionary new-type lightplane, there is no simple answer to the question above. But the diagnoses and remedies offered are significant because, for the first time, they place in perspective the differences of opinion of aviation authorities by *groups of interest.*

Operators, pilots and Government officials tend to disagree with lightplane manufacturers on the main problems facing private flying.

These operators, pilots and Government officials agree, statistically speaking, that the main trouble with private flying is (a) lack of utility of airplanes, or (b) high cost of flying. Ten of 14 answers agree on one or the other, or both, of these points.

But no manufacturer or manufacturer's representative mentions either. They offer seven different answers. Three manufacturers agree that airports and airport facilities are the most important problem confronting private flying, and three say consumer education (*Continued on page* 76)

MORE STATEMENTS ON PAGES 18-19→

OPERATORS' SPOKESMEN

James W. Batchelor
General Counsel, UPMA

LACK OF MONEY . . .

LACK OF MONEY is the biggest single problem of private flying. The deterioration in private flying activity has progressed step by step with the withdrawal of money from private flying activities.

The future of private flying depends on the profitable use that can be made of the airplane. There are as many persons today who are eager to fly as there were at the close of the war, but since the profitable use they can make of the private airplane is so limited, they cannot afford to undertake it.

Many highly specialized uses for the airplane have been developed, such as pipe-line inspection, insect control, communications line laying, forestry inspection, home use of the airplane for seeding, dusting and land inspection. These activities developed with comparative lack of Government control. Now, the imposition of increasing Governmental regulation is limiting their profitable use. This discourages private flying. The CAR should be amended so that practically any type of operation can be carried on by the private owner so long as he does not actually receive money for his flying.

Wayne Welshaar
Secretary, ATS

PROBLEMS ARE MULTIPLE . . .

PRIVATE FLYING'S problems are multiple rather than single. Perhaps the biggest single problem is that of going where and when you want to go at a reasonable price.

Airplanes are an element of airpower, and airpower and national security are inseparable. The Government has rightfully a stake and certain responsibility for aviation. That does not mean certainly that "Uncle" must pick up every check. But it does mean that those jobs which the civil aviation bases of the country can do in getting most national defense for least dollars should be done by them.

Whether we like it or not, aviation is in a shakeout process in which only the more efficient units will survive. Don't let anyone tell you that all aircraft manufacturers and fixed base operators are dullards, dopes or double dealers. Let those who believe fairly smart men become nitwits the minute they touch anything connected with aviation get into the game themselves and prove what they may.

Let aviation editors quit selling the public 1952 models of planes which too often never materialize beyond the stage of paper and specifications.

Harry Meixell, Executive Director, NATA

NEEDED: COOPERATION

THE DEVELOPMENT and expansion of private flying are confronted with so many vitally important problems it is difficult to single out any one.

Many critics contend that present day personal aircraft fail to meet the requirements of potential buyers and users. They allege that plane manufacturers have failed to embrace in their products known and tried improvements.

Others contend that personal aircraft are too costly. Another school of thought maintains that the most serious obstacle to widespread and greater usage of personal aircraft is the inadequate number of airports and other landing facilities readily accessible to centers of population. Still others insist it is too difficult, time-consuming, and costly for a person to learn to fly.

There is one problem which transcends all others—namely the need for all branches of the aviation industry and all segments of those interested in personal flying to unite in thought and action for common objectives, which alone can deal successfully with the problems.

Lloyd Child, Secretary
Non-Scheduled Flying
Advisory Committee

INCREASED UTILITY . . .

INCREASING the utility of the aircraft will make possible better service rendered and will obtain benefits by which the whole of society will be enriched.

It seems to me that this problem is not simply that of the designers and manufacturers of personal type airplanes, but upon its solution depends the welfare of the whole aeronautical industry. If aviation ever is to be a big industry, as we who are working at it believe it will be, mass demand through greatly increased utility will have to be attained.

It was the mass demand for the private vehicles which brought about the great automotive accomplishments. I think that in an automobile a person obtains more satisfaction and diversified utility per dollar than in any other mechanism. It can be used for business or pleasure, day or night, in foul or fair weather.

Personal type airplanes are bound to be in this category sooner or later. In my opinion they should have a capacity for four persons plus baggage, have a cruising speed approaching 150 m.p.h., and have landing speeds and characteristics slower and much better than today's airplanes.

PILOT REPRESENTATIVES

J. B. Hartranft, Jr., General Manager, AOPA

MAKE IT MORE USEFUL . . .

BIGGEST SINGLE problem facing private flying today is the necessity for making it more useful. By that I don't just mean "utility," as it has been referred to so much in the past. I mean private flying must have much greater safety, many more sound businessmen, better nationwide facilities—and, of course, more utility. I think, though, that once you get those first three things I've mentioned, you'll automatically get the increased utility.

If there is one thing we might point to as a "cure," I'd say private flying needs a pronounced change in the attitude of the people responsible for the industry. Instead of that much-used phrase "let the customer beware," private flying needs a 1949 version of that: "let the seller beware." Give us that change in attitude—which will bring with it all those other things we think so vital to the survival of private flying—and I think this industry will be well on its way to taking its place alongside the personal automobile industry.

Lynn L. Bollinger, Director, Aeronautical Research Foundation

INADEQUACY OF THE AIRPLANE . . .

AFTER SPENDING 18 months investigating this very problem, with the assistance of a research staff who helped to conduct on-the-spot inquiries amongst 180 fixed-base operators, Arthur Tully and I concluded that private flying's biggest single problem is the inadequacy of the airplane itself.

Today's private airplane has the fundamental disadvantage of requiring a relatively large and smooth area of land from which to launch itself into the air. And once airborne, it must retain a high forward velocity until it again comes to rest on a large area. This inherent limitation both robs it of utility because of the relatively few places it can take off and land, and also increases the dangers from forced landings due to bad weather, engine failure, and the like.

Therefore, I believe that the biggest single inadequacy of the airplane is *the high forward velocity that must be maintained in flight.*

AIRCRAFT MANUFACTURERS

T. Claude Ryan President, Ryan Aeronautical Company

ECONOMICS OF DEVELOPMENT . . .

FROM the manufacturer's view, the biggest single long-range problem confronting the future growth of private flying is the economics of how to make it feasible to do the desirable amount of advanced design and long-range development work.

There exists a combination of conditions that makes it impractical, from a business standpoint, to do the engineering development necessary to give the maximum rate of advancement. At present it would be virtually impossible to recover the costs of applied research and experimental and design work on personal type planes that would provide the rate of progress that is possible, because the write-off on the present and near future volume would be prohibitively high per unit.

Scientific information is available to all manufacturers which, if fully utilized, could result in types of aircraft which have still greater utility, safety and all-around practicability.

Since the war, only two entirely new, thoroughly modern designs have been developed in the personal-business type plane. Who would undertake development expense today?

Robert McCulloch President, TEMCO

LACK OF GROUND FACILITIES . . .

PRIVATE FLYING'S biggest single problem is lack of adequate ground facilities to permit full utilization by private aircraft owners of the primary advantages of flying—fast and economical transportation.

Until all-weather airports for private planes are established in increasing numbers with facilities to provide service, comfort, and convenient means of ground transportation to and from these airports, private flying will necessarily be limited to relatively few individuals in relatively few localities in the nation.

The effect of a restricted market extends to all concerned with private flying. The principal adverse effect is on the manufacturers of personal planes and equipment for personal planes. Without a market expanding at a reasonably rapid rate, these manufacturers cannot undertake the investment involved in improved designs of personal planes and equipment and improved production technique that will provide safe, fast and comfortable personal planes with adequate range at economical prices.

John A. Lawler President, Aeronca

THE CHICKEN AND THE EGG . . .

I BELIEVE that private flying's biggest problem is:

Airports—set up to provide service and services.

It's the old problem of the chicken and the egg. The airport operator, we realize with complete sympathy, finds it extremely difficult to provide these things without volume traffic. Therein lies the problem. Every day more operators are finding the answers.

What will create that traffic and that volume? What will make more and more people want to own and use the airplanes they do own?

Airports. Greater numbers of them, fewer miles between them, more communities with them.

Service. Enough volume to set rates at fair price levels. More completeness and fewer delays.

Services. Food, local transportation, and all the other things the traveler has learned to look for.

Some day, when we wake up to discover that private flying has come of age, the miracle will have its roots in those people and communities who are beginning to recognize the private flyer and give him what he wants.

Joseph T. Geuting Manager, Personal Aircraft Council, AIA

"NO BIGGEST SINGLE PROBLEM . . ."

PRIVATE FLYING has no "biggest single problem" any more than has, say, the publishing industry. Private flying, as an industry, faces the same problems as *every* industry.

1. It takes good salesmanship to sell anything, therefore we need good salesmanship.

2. It takes adequate facilities to bring about full utility of a product, therefore we need adequate facilities.

3. It takes satisfied users to create an expanding market, therefore we need satisfied users.

On Point No. 1, those who have learned to concentrate upon the aircraft sales end of their numerous activities have found that it pays off.

On Point No. 2, since the end of the war, our airport total has doubled. We have 6,000. We need three times as many.

On Point No. 3, we have found that the utility of today's aircraft appeals to and serves the needs not only of personal pilots but also those engaged in agriculture and business.

These are but three of the problems we work on ceaselessly. There are many more, and I reiterate my contention that there is no "biggest single problem" in private flying.

LACK OF UTILITY . . .

Jerome Lederer
Director, Flight
Safety Foundation

THE ANSWER is well known: Lack of utility.

What constitutes lack of utility? Inability to fly from take-off to intended destination regardless of normal weather conditions (day or night) at reasonable cost *and* with reasonable safety.

The solution calls for several technical achievements:

1. Reliability of power sources, or an inexpensive dependable auxiliary source of power.
2. An inexpensive means to fly without visual reference to the earth and without the need to maintain costly instrument flying proficiency.
3. An inexpensive method of establishing accurately our position in space at all times.
4. An inexpensive but reliable means of communicating with sources of safety information (weather, field conditions, air traffic).
5. An inexpensive and simple means for assuring ice-free wings, propellers, carburetors, windshields, tail surfaces.

LACK OF LANDING FIELDS . . .

Forrest Watson
President, National
Flying Farmers Assn.

FLYING some 30,000 miles cross-country each year, I find my landing fields range from small sage brush-covered cow pastures to dual runway metropolitan airports. From the pilots' standpoint, I need only ask myself this one simple question and the answer comes back as an echo: "Lack of practical close-in landing fields."

Since the majority of our airports are from four to 25 miles distant from the business districts of our towns and cities, private flying has been operating under a most serious handicap. Overcome this problem and such things as high prices, poor service, overcharges, etc., will in time correct themselves. The present day airport setup is not only an inconvenience to those who choose to fly airplanes, it becomes the outstanding reason why the average businessman is and may continue to be an almost total stranger to private flying.

In order to sell Mr. Public a piece of new merchandise one must get it before his eyes. Aviation has not done this.

EDUCATIONAL . . .

W. T. Piper, President
Piper Aircraft Corp.

PRIVATE FLYING has several important problems, but the greatest single one is educational. In fact, I believe that practically all of our problems have their root in this one.

Flying is a revolutionary means of travel. Although the first planes were flown over 45 years ago, the number in use is still comparatively small and it is doubtful if one person out of 10 has ever had a ride in an airplane. It is impossible for one who has never made a trip to fully appreciate the speed and comfort with which long trips can be made until they have actually experienced it themselves. This is an educational problem.

We are woefully deficient in ground facilities and that is also an educational problem. The authorities—municipal, county, state and federal—must be educated so that they appreciate the advantages of spending for these things.

There is another education job. It is to teach the non-flying public who can best use a plane. For years people have been told that flying is a young man's game, but that is not true. It takes leisure time and money to fly an airplane.

UTILITY OF THE AUTOMOBILE . . .

A. B. McMullen, Executive Secretary, NASAO

WHAT PRIVATE flying needs most is an air vehicle which includes the quietness, safety, economy and utility of the automobile.

Over one million young men and women have learned to fly during the past 10 years. Airports have increased by 38 per cent. Yet, during 1946, the first post-war year with all these new pilots, more airports and favorable economic conditions, only 36,670 civil aircraft were manufactured. In 1947, there were only 17,717, a decrease of 48 per cent, while 1948 witnessed a drop to 6,969. During this same period, the sale of automobiles increased.

It clearly appears that too much emphasis has been placed on pilot training and airports in relation to research and development in the small plane field.

The price of two or three super bombers spent in research, development, initial production, and time payment financing of a more useful aircraft for private and industrial flying, should not only solve the principal private flying problem, but a large percentage of our major military and civil aviation problems as well—and at a saving to the taxpayer.

BROAD CROSS-COUNTRY EXPERIENCE . . .

Don Flower, Sales
Manager, Cessna

I BELIEVE our greatest problem in personal flying is that of building up broad cross country experience in the approximately 500,000 pilots who hold licenses today. Rather than have one airplane wear out three or four owners, each owner should wear out a series of airplanes. Today's normal student gets so many "don'ts" and "be carefuls," so much airport flying and so little sound cross country experience, that unless he is an overly bold type he never gets over a couple hundred miles from his local airport.

We are selling today's airplanes short. Let's take the lowest priced airplane in our line—the Cessna two-place 120 with an 85-h.p. engine. Wichita is in the middle of the United States. Yet you can still fly a Cessna 120 from Wichita to Washington, D. C., for instance, and come within about an hour of airline schedule—and do it regularly. I have done it many a day and the total out-of-pocket cost was under $20 each trip for gasoline and oil. Yet the average flight instructor, I am afraid, would sell you some other means of transportation. He has never tried it.

LACK OF PUBLIC REALIZATION . . .

John P. Gaty, Vice
President, General
Manager, Beech

PRIVATE FLYING'S biggest single problem is the lack of widespread public realization that modern private airplanes can make an invaluable contribution to business efficiency.

The state of the development of the post-war private airplane is adequate; the facilities for its use are adequate; and the level of skill of the available pilots is adequate. While the first cost of any first-class airplane is high, business does not measure the value of an investment primarily by first cost but generally by operational cost and results attained.

Business men who use modern private airplanes often express amazement at their utility and low operating cost.

The attainment of a widespread public realization of the true business value of the personal airplane will create a respectable market volume. This volume in turn will improve the price situation; the distributor's and dealer's margins of annual profit; the number of airports; and all the other factors which will make personal flying better, but which can flow only from widespread ownership.

Ride in the cockpit with Bill Odom as he flies 5,000 miles from Hawaii to New York.

How I Did It

Author checks Bonanza he flew to set an international non-stop distance record for light airplanes.

By BILL ODOM

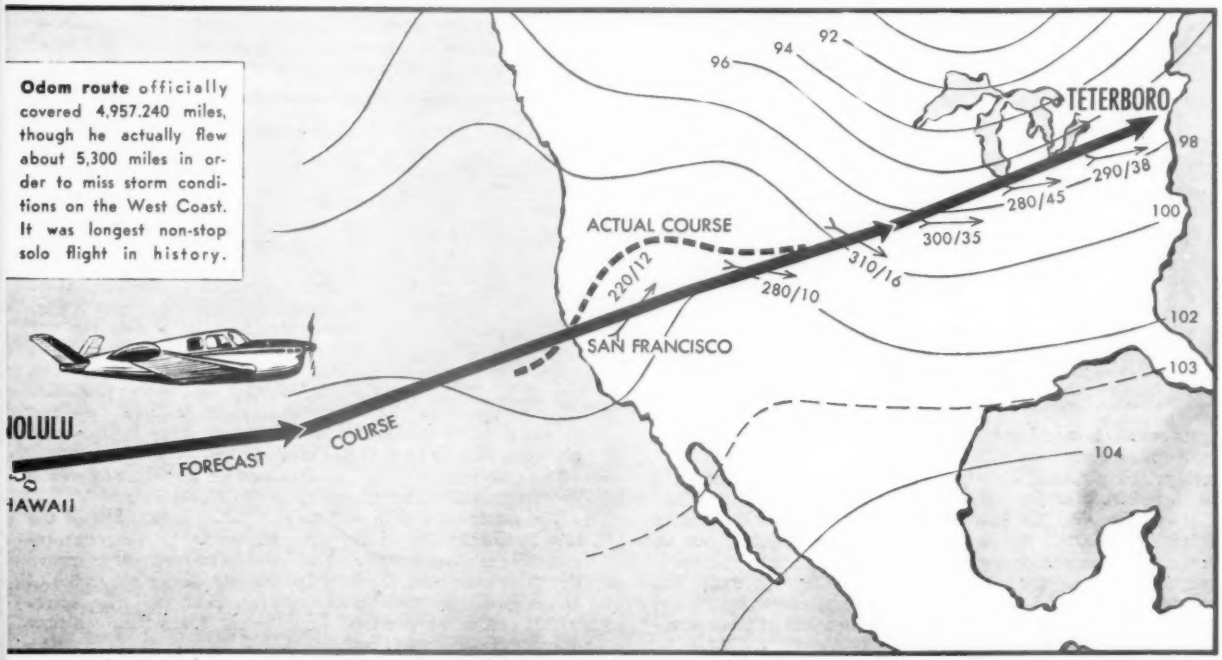
TWO NEW INTERNATIONAL records were set on my recent flight from Honolulu, T. H., to Teterboro, N. J., in the *Bonanza "Waikiki Beech."* The *Federation Aeronautique Internationale* in Paris has officially recognized the 4,957.240-mile flight as a new international distance record for lightplanes. And the National Aeronautic Association, after instrument calibration by the National Bureau of Standards, has announced it is down in its books as the longest non-stop solo distance flight in the history of aviation.

The flight really began when I climbed into the airplane and turned on my Lear VHF radio. I called the Honolulu tower and asked them for take-off instructions. I had filed my flight plans some 30 minutes before, and within a few seconds the Honolulu patrol car called me saying, "NX80040, here is your clearance. Are you ready to copy?"

I grabbed a pencil and a pad of paper for the purpose and acknowledged that I was ready to copy.

The tower came on the air. "NX80040, this is Honolulu Tower—Airways Traffic Control clearance Beechcraft *Bonanza* 80040 from the Honolulu Airport to the Teterboro Air Terminal to cruise and maintain 5,000 feet until further advised."

ROUTE OF LONGEST NON-STOP SOLO FLIGHT



Bonanza used by Odom carried extra gas (124 gallons in wingtip tanks and 126 gallons in cabin tanks) but was nearly standard production model.

The clearance came in such a calm matter-of-fact voice that I might have been sitting in the cockpit of a gigantic DC-6 with all of the electronic equipment and a large crew to handle most of the jobs on my non-stop flight of 2,474 miles over the Pacific Ocean and 2,799 miles over continental United States to Teterboro Air Terminal.

But I was alone, and my mind quickly reviewed the preparations which had been put into the airplane. I thought of the hours of engineering time, the excellence of the Beechcraft mechanics who had prepared the plane for the flight, and the many careful hours which had been spent checking the Continental Standard E185 engine. Everything had been done that could be done to make my flight fool-proof. I revved up the engine, released the brakes, and was off the ground after a 2,500-foot run.

I ran a little farther than was absolutely necessary in order to gain excess speed. It was a night take-off and I wanted to have plenty of performance when I left the ground. The *Bonanza*, though its take-off weight was 3,858 pounds, had a 160-feet per minute climb while the gear was down, but as soon as the gear was completely retracted I had 400-feet per minute rate of climb.

As I swung out over Waikiki Beach, past Diamond Head, climbing to my cruising altitude of 5,000 feet, a B-17 operated by the U. S. Air Force and equipped for air-sea rescue pulled in alongside, slightly behind and above me. He sat there for 900 miles over the Pacific Ocean, watching me either visually or through his radar.

As the lights of Honolulu faded behind and I leaned the engine, it seemed to me that instead of getting a smooth r.p.m. drop as I had on my test flights, the engine was just a little rough. I explained this to the boys in the B-17, more or less just to have something to say. They replied: "All single-engine airplanes go into automatic rough as soon as you lose sight of land."

They were right. When I passed over San Francisco 16 hr. and 47 min. later, it suddenly began running just as smoothly as glass and it has run that way ever since.

I maintained constant communication with the escorting B-17 through my VHF radio and did not take the time or energy to operate my CW set (telegraphic code set). I was trying to hold my code copy to a minimum, especially during the night hours where lighting was a problem. The B-17 carried out the long range communication. He was only a few yards from me and when he gave his own position he also gave mine. I was steering pre-computed headings by Sperry gyros and compass, and I was delighted when, about one hour out of Honolulu, the navigator reported we were only one mile south of track. The entire flight was navigated by dead reckoning. This had proven amazingly accurate on my previous record flights when done in conjunction with gyros and compass and has proved beyond a doubt to me that the greatest error encountered in dead reckoning navigation is in the inaccurate headings which are indicated by the standard magnetic compass. No alterations (*Continued on page* 71)

Are Jet Fighters

By R. G. NAUGLE

THE NEWEST CALCULATIONS of the Air Force indicate that bombers are no longer the sitting ducks that armchair strategists have been figuring them for. This applies even to the propeller-driven B-36's and B-50's.

"They have the range," the "experts" have been saying, "but not the speed to be anything but easy targets for fighters in the class of the F-80, F-84, and F-86."

With the new bomber tactics that have been worked out, the above statement just isn't so. The bombers, as we shall see, are now operating under special conditions which are more than giving the fighters a run for their money.

It was vitally necessary that new bomber tactics be devised to neutralize the speed and power of jet fighters. The destructive power of the A-bomb requires fewer bombers for a given mission, yet never before has it been so important that they all get through. Our geographical position demands that we have bombers with intercontinental range and so the use of escort fighters is a thing of the past. The modern bomber, therefore, must be a self-contained weapon and be able to outrun or outwit the enemy's interceptors in the combat zone.

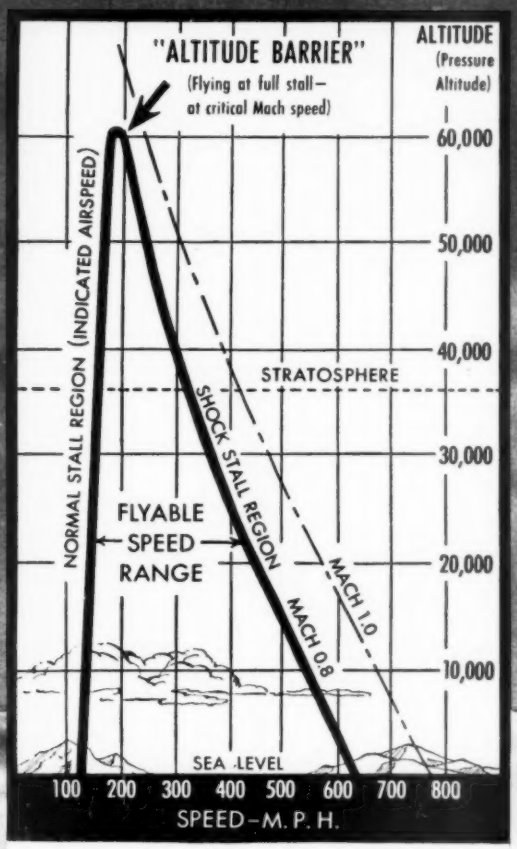
It was necessary that some sort of *tactical cover*, or mode of flying, be devised that would force the fighters to fight on terms dictated by our bombers. The blinding speed of a 600-m.p.h. jet bomber would allow it to do this but the fuel demanded would severely restrict range.

Interception-free bomber sweeps into the target zone are now possible by flying along the protecting edge of the sonic barrier. Fast, short range, medium altitude jet bombers like the sweptwing Boeing B-47 can fly just below the speed of sound and keep ahead of even the fastest present-day subsonic fighters since both now have about the same critical Mach number and consequently the same top speed. This situation will exist until we break through into the supersonic world. However, their range is inadequate and must be stretched by some artificial means such as in-flight refueling. The recent B-50 flight around the world with four such refuelings proved the practicability of the idea but in-flight refueling involves the inherent risk of not making successful contact and thus jeopardizes delivery of the bomb.

In fact, our present trailing-hose system, adapted from the British and used on transatlantic freight runs, is not

Overrated?

High altitude and high speed performance may be making U.S. bombers invulnerable to attack.



Speed range between stalling and onset of compressibility decreases to zero at plane's "altitude barrier."

suited to high-speed jet bombers. The prospect of trailing several hundred feet of two- to three-inch hose through the air at 300 to 400 m.p.h. is not a happy one. To make use of the protecting sonic barrier, then, it would appear that a new means of aerial refueling will have to be developed in order to get the range. Even then, certain operational risks would be involved under almost any circumstances. These risks are calculable but perhaps not acceptable.

But there is another possibility and one that at the present time offers the same degree of protection as high speed. The sonic barrier has long captured the imagination of designers and military men, but tacticians of strategic bombing have suddenly realized that the "altitude barrier" lying somewhere in the stratosphere may also be used as a tactical cover. In fact, compared with the sonic, it would seem that the protection may be equal while the problems are less difficult. Being over the target at 45,000 feet and above the fighter's effective combat ceiling would be just as effective as being at the same level and ahead of him.

At the beginning of World War II, our Air Force was solidly committed to the principle of high-altitude, visual precision, daylight bombing. The British were committed to area bombing at night. Ac- (*Continued on page* 67)

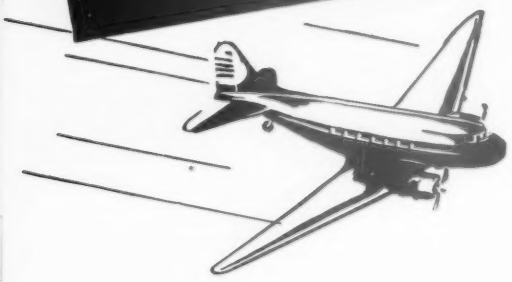
High-altitude long-range B-36D will have ceiling well over 40,000 feet, where it may be more than a match for planes similar to U.S. jet fighters. Bomber above has J-35 jet engines installed in B-47 pods, although the production version will utilize more powerful J-47 jets.

CARTOONS BY FRANK ADAMS

One stewardess, flying in rough air for the first time, startled the passengers when she knelt in the aisle and prayed.

The passengers voted on whether to stop to eat in Albuquerque or fly direct to Los Angeles. The hungry segment won out.

COAST TO COAST FOR $99



By LARRY JACOBS

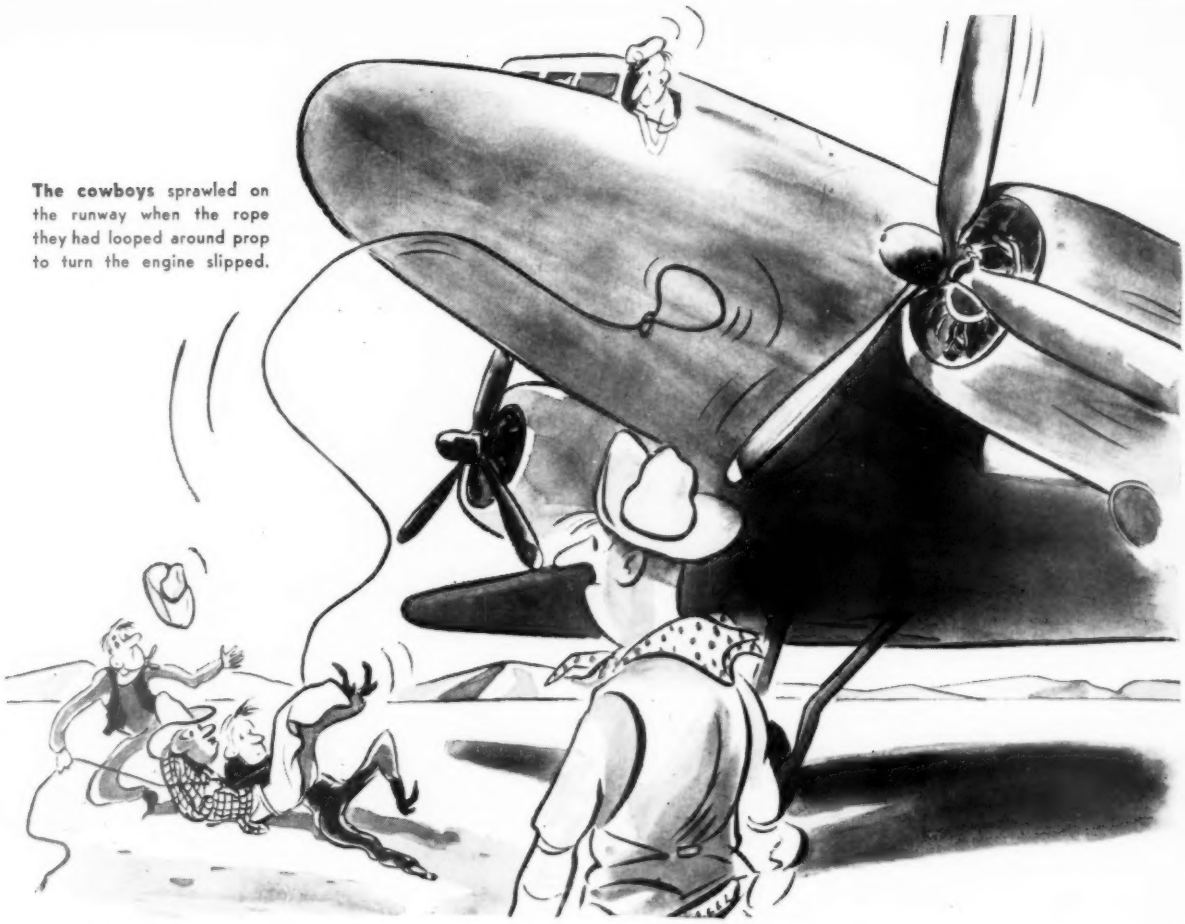
Flying cross-country with transcontinental non-skeds still rates as an adventure.

I'VE JUST FLOWN coast to coast and back with the 99ers—those happy-go-lucky non-scheduled operators who sell tickets through travel bureaus and who are likely to be ruled off the airways if the scheduled airlines and the CAB have their way. The 99ers, in case you didn't know, are so-named because they transport passengers between the two coasts for $99.

When I first considered vacationing in California I didn't think I had time or money enough to make it. But the 99ers made it possible and I'm grateful to them. I not only enjoyed my stay in California, thank you, but combined in my trip the happier elements of three previous cross-country journeys—one by hitchhiking, the second by automobile with friends, and the third with the scheduled airlines. The latter was nice but it somewhat jarred my solvency. Hence my flying the non-skeds.

I stumbled upon the 99ers cold after being tempted by advertisements in Washington and New York papers promising a 12-hour transcontinental flight for a third less than the major airlines' tariff. So I investigated.

A friend with the Civil Aeronautics Administration in Washington assured me that the 99ers' planes had been inspected for airworthiness and that their pilots, although not required to hold airline transport ratings, were examined semiannually. He disconcerted me momentarily



The cowboys sprawled on the runway when the rope they had looped around prop to turn the engine slipped.

by recalling that a non-sked DC-3, flying a chartered trip to the South in 1946, crashed in Virginia with a loss of 27 lives. But this hadn't happened on the transcontinental route and so I decided it didn't count. I bought a ticket.

Flying with the 99ers wasn't only a cheaper journey; it seemed to me to be a sort of atomic-age swashbuckling. The starched formality of the scheduled airlines was missing and in its place was the informality of a house party. The meals the non-skeds didn't serve weren't missed, much. One of the stewardesses didn't wear a uniform but none of the passengers seemed to mind. Another stewardess became ill during rough flying over Arizona and a passenger promptly took over her duties. But that was trivial. The co-pilot told me that on one of their trips the stewardess, beset with rough air for the first time, knelt in the aisle and prayed.

The money-saving methods of the non-skeds were apparent the moment I arrived at National Airport, Washington, on the night of my departure. A porter informed me that the 99ers had no leased quarters there and directed me to the CAA operations office, a portion of which was utilized as a waiting room for economy-minded tourists.

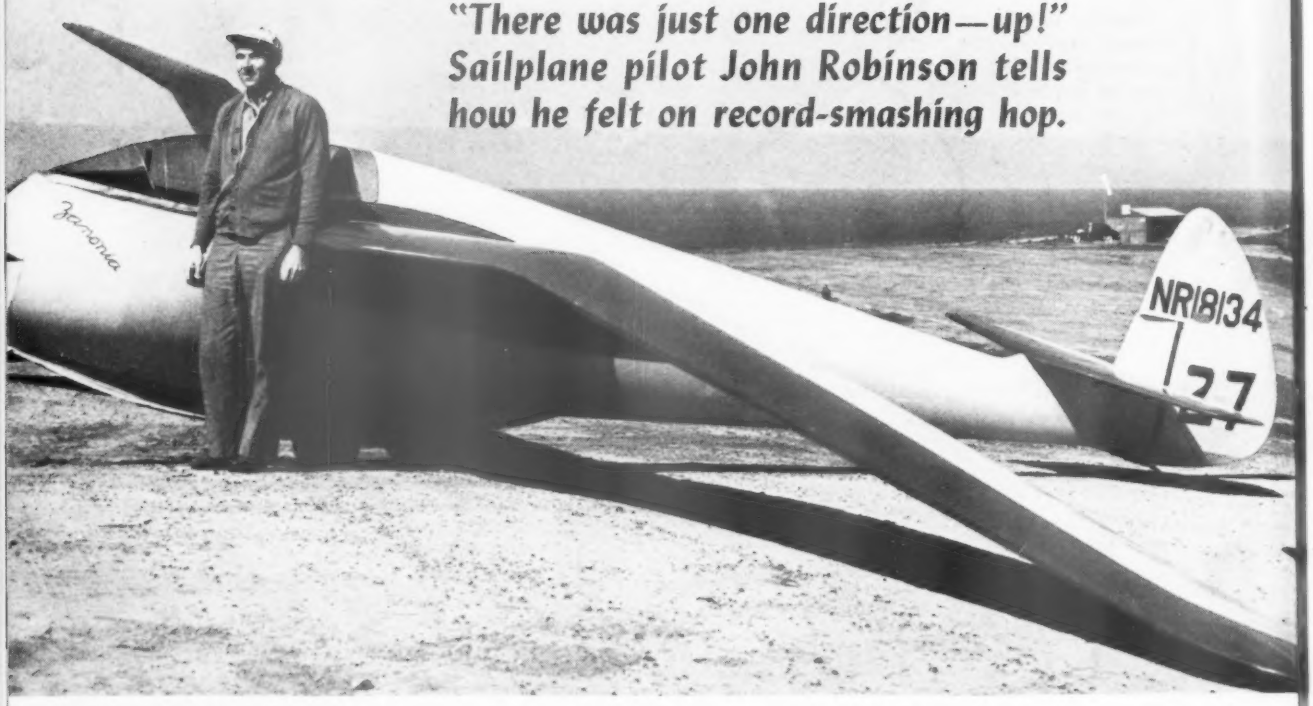
Five other passengers and I spent a half hour in this office, just off the loading apron, speculating about which of the non-skeds would come in from New York to take us west. We had been told when we arranged for passage with the ticket agency that we'd fly with any one of five lines associated with it. When a Trans-American Airways DC-3 arrived it didn't taxi up on the apron to receive us. We were told that it didn't have permission to load there. The six of us were directed to a Jeep with no top which trundled us to the edge of the airport and the waiting plane.

Inside the converted war surplus transport, the economy motif was in sharper focus. The seats were reasonably comfortable but there were no reading lights, no air vents, no overhead racks. The stewardess took my topcoat and hung it over a length of pipe in the rear. We were barely out of Washington when she returned and asked if I'd have coffee. When I said yes she discovered that the stove wasn't working. She called the co-pilot and he took the electric cord up front to work on it. Six hours later, as we were approaching Kansas City, the stewardess marched triumphantly down the aisle and proudly presented me with a steaming cup.

Meanwhile the plane had refueled at Dayton. We lost a passenger there. He was a young New Yorker headed for his wedding in California (*Continued on page 58*)

THE 'Zanonia's' Record Flight

"There was just one direction—up!" Sailplane pilot John Robinson tells how he felt on record-smashing hop.



Record-breakers John Robinson and glider Zanonia rode a powerful "standing wave" near Bishop, Calif., in January to set three new soaring marks.

By JOHN ROBINSON

THOUSANDS of baggy-eyed U.S. citizens were dosing themselves with seltzers and piling ice packs on their heads the morning of January 1, 1949. While they bemoaned their excesses of the previous night, I prepared to get high in a different way. In fact, that morning I didn't realize I would probably get higher than any other New Year's celebrant—and that I would do it in a glider.

At Bishop, Calif., a village located in the Owens Valley midway between two 13,000-foot mountain ranges, I was looking forward to a soaring pilot's holiday. I wanted to fly in the violent air that accompanies a "standing wave." These waves occur downwind of mountain ridges during conditions of strong winds (over 25 m.p.h.) if there is a temperature inversion or frontal surface low enough to be involved. Soaring in the waves is specialized fun because they are more powerful and go higher than any other type of lift.

GLIDER EXPERT

John Robinson, nationally-known glider enthusiast of Arcadia, Calif., established records in three classifications on his spectacular flight, January 1, 1949: (1) U.S. record for altitude gained above low point in single-place gliders (24,200 feet), (2) U.S. record for absolute altitude above sea level (33,500 feet), and (3) international record for absolute altitude above sea level (pending FAI recognition) of 33,500 feet. Robinson also holds the U.S. distance record of 325 miles for single-place gliders, and is a three-time American Soaring Champion.

To the west of Bishop Airport I could see the Sierra Nevadas, with peaks thrusting up beyond 14,000 feet. And to the east, the White and Inyo mountains bulged up against the skyline. Conditions seemed ideal. The "standing wave" had been found often at Bishop, and the Weather Bureau forecast strong winds over the Sierra Nevadas.

Northwest of Bishop, a series of lenticular clouds were stacked above each other, rising in almost perfect symmetry to incalculable height. Southward, I could see the end of a long roll cloud, further evidence of the wave condition. Despite a 44° temperature, snow was on the ground and the air was numbing.

I took off in my glider, *Zanonia*, on double tow at 12:25 p.m. The accompanying sailplane, the *Orlik*, was piloted by its owner, Paul MacCready. Our BT-13 tow plane, piloted by Dick Lyon, towed us west about 10 miles to the approaches of the Sierra Nevada range. Within 20 minutes we reached a tow altitude of 10,000 feet (6,000 feet above take-off) and released into turbulent air below a lenticular cloud area. The tow plane rapidly disappeared downward as my variometer (a sensitive rate-of-climb especially designed for gliders) indicated a climb of 1,000 f.p.m. We were close to the east side of Mt. Tom, 13,649 feet high, with a west wind blowing. After three circles, Paul disappeared westward.

I dropped from tow altitude of 10,000 to 9,400 feet then began a climb to cloudbase. The clear air under the

cloud boiled and churned like water in a coffeepot. The up and down drafts had such sharp edges that the ship would pitch or dive violently to exaggerated attitudes. Once, while indicating 60 m.p.h. airspeed, the nose pitched up past 80°, nearly vertical, standing the plane on its tail, then levelling it out again without stalling. My stall speed is 44 m.p.h. Seconds later I was thrown into a vertical nose down position because my tail was still in an updraft while my wing had entered a downdraft. Airspeed changed only from 60 to 70 m.p.h. in this maneuver as I pulled the control stick back while hanging in the safety belt. The glider had been literally slapped down from beneath me.

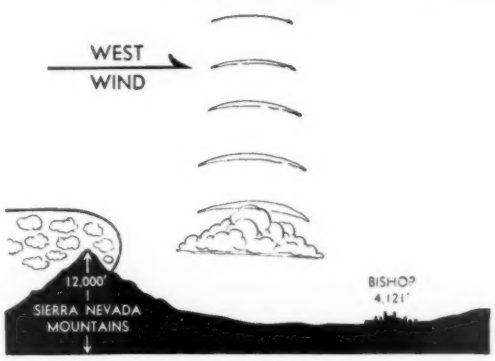
I had one small cause for gloating. The week before I had thoroughly vacuumed the *Zanonia's* interior. I would otherwise have been sneezing and choking in a cloud of dust.

Adding to the general discomfort, frost coated the inside of the canopy, making visibility poor. The sunshine raised the cockpit temperature to a comfortable 60°, but the air outside was below freezing. Moisture from my breath, combining with the warm air, was responsible for the frost. Eventually I fought into an updraft large enough to permit circling without getting more "down" than "up" in each turn. I spiralled to cloudbase at about 12,000 feet and continued to climb within the cloud, on instruments, to 16,000 feet in much smoother air. This lift was definitely wave action, but the cloud made it impossible to observe its exact pattern. Breaking out of the soup, I searched vainly for additional lift.

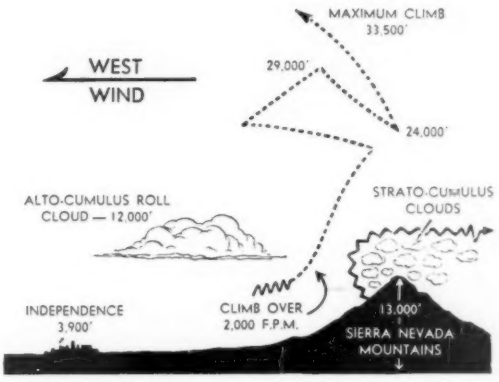
After covering the area I decided this particular wave was being disrupted by changing winds and would not go higher for the present. With (*Continued on page* 52)

"Wave action" clouds south of Bishop included alto-cumulus, with base 9,000 feet above ground and, above it, lenticular-stratus.

WIND CONDITIONS AIDED FLIGHT



Looking north before take-off at Bishop, Robinson saw a series of lenticular clouds, indicating a "standing wave."



Looking south from Bishop, Robinson's climb path is indicated. Near Independence, he reached record 33,500 ft.

Otto Koppen, Helioplane's designer, built first lightplane for Henry Ford in 1925. He is M.I.T. professor.

Prof. Lynn Bollinger of Harvard is a six-footer, yet looks small beside Helioplane's nine-foot propeller.

Joseph Garside, president of E. W. Wiggins, whose shop built the plane, examines the leading edge slat.

IS THIS *The 'Revolutionary' Lightplane?*

By JOHN C. ROSS

Flaps and leading edge slats help give new experimental Helioplane amazing short-field performance.

Helio Corp.'s Helioplane is conventional appearing craft until observer notices full-span slotted flaps, leading edge automatic retracting slats, split rudder, huge prop.

FOR THE FIRST TIME the aviation industry has created an airplane that can operate from a tiny one-way strip less than a block long right in the heart of built-up areas—and at the same time is sufficiently quiet to arouse no objection from its neighbors. It is as easy to fly as any other three-control lightplane and can be flown and maneuvered at less than 30 m.p.h. with no risk of stalling.

As it sat on the hardstand in front of the E. W. Wiggins hangar at Boston Metropolitan Airport, Norwood, Mass., last month, it appeared, from a distance, to be just another conventional fabric-covered strut-braced monoplane. But closer examination revealed leading-edge slats, full-span flaps, and an odd-looking split vertical rudder. Hanging on the nose was an outsize propeller that looked as if it had been borrowed from a fast Air Force fighter.

It is called the *"Helioplane,"* a name that is meant to imply that it is an aircraft with virtually the landing and slow-flight characteristics of a helicopter—combined with the speed and simplicity of an airplane. The *Helioplane* was designed by Otto C. Koppen, Professor of Aeronautical Engineering at Massachusetts Institute of Technology. The performance requirements were laid out by Dr. Lynn Bollinger of Harvard Graduate School of Business Administration, a former airline pilot and fixed-base operator.

Here is what the *Helioplane* has been designed to accomplish:

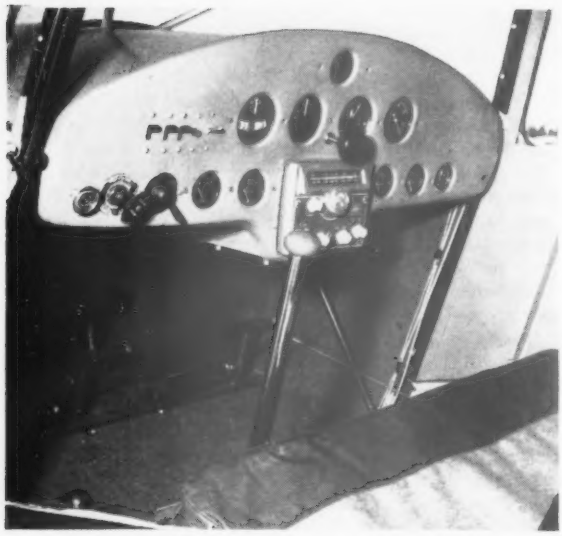
- To land and take off with full gross load in standard still air in less than 100 feet, and to clear a 50-foot obstacle from rest in well under 300 feet. This means ability to land or take off into a 10 m.p.h. wind in less than 50 feet.
- To approach with flaps down at about 30 m.p.h., yet to have the ability, with flaps partially retracted, to increase airspeed and maintain a comfortable 20 to 30 m.p.h. ground speed.
- To be not only spin-proof but absolutely stall-proof. Flying at 30 m.p.h. the *Helioplane's* wing is still 14° below the stall angle—as good as a normal plane at cruise.
- To be as quiet in flight as a passing automobile.
- Despite the slow-speed performance, to cruise with full gross load at 108 m.p.h. with a Continental 85-h.p. engine at 75 percent power.

If the *Helioplane* reaches these performance goals, and if it is put into large-scale production as seems likely, it can well revolutionize private flying.

No precise checks had been run on cruising speeds up to press time, but several slow speed flights had been made down the mile-long runway, clocked by a car driven at the *Helioplane's* wing tip. There was a direct cross-wind of perhaps 2 m.p.h. The plane flew with full control under 30 m.p.h. There was no semblance of stall or mushing. The landing roll was well under 100 feet.

The only take-offs so far checked were with only the pilot aboard and without full gross load. The plane was off the ground and flying in perhaps 65 feet. In every case it was climbing before it passed the measured 100-foot mark, and in every case it was off the ground before the pilot could get his throttle all the way in. The test pilot is John W. Phillips. He says simply: "The *Helioplane's* take-off performance will more than meet the designer's claims."

The *Helioplane* has a gross weight of 1,250 pounds and an empty weight of 745 pounds, permitting a payload of about 500 pounds. It is not a trick stripped-down airplane. It has everything standard lightplanes have and then some —including starter, generator, battery, radio, Goodyear



Attractive cockpit of Helioplane has conventional gauges and instruments, including radio and bank and turn indicator.

Split rudder of craft is one of Prof. Koppen's new developments. There is automatic linkage in plane's control system.

cross-wind landing gear and an Aeromatic prop.

The search for a lightplane with its performance ability goes back more than four years to a time when Professor Bollinger was asked by a major airframe manufacturer to make a survey of the post-war lightplane market.

His conclusions were pessimistic. In the face of widespread estimates of a 300,000 airplane market, Bollinger's findings indicated that about 38,000 planes might be manufactured in the United States during the first post-war year—actually there were about 35,000—and that thereafter the market would weaken rapidly. This is exactly what happened.

He decided then that "the fundamental problem with private flying in most parts of the country was—and still is—the inaccessibility of the places you can fly present day planes to and from—the airport location in other words."

"At the time of this earlier survey we concluded that an absolute minimum requirement for a mass market was a plane that would use a one-way strip with not over 900 feet between 50-foot obstacles—or 600 feet on the ground if there were no obstacles," Bollinger says.

"That naturally was an arbitrary judgment. Subsequently, when post-war personal flying began to develop, we discovered that these specifications would have been inadequate. Higher income neighborhoods generally refused to permit flight strips of any kind—primarily because of noise.

"That added a second requirement: quiet airplanes."

The National Advisory Committee for Aeronautics early in 1947 demonstrated the principles of aircraft quieting on a modified L-5 and has since financed basic research on noise reduction through the Aeronautical Research Foundation—which was founded in the interest of personal aircraft development. Bollinger, by the way, serves as Executive Director of the Aeronautical Research Foundation, but the ARF has no connection with the new airplane which uses a basic design developed by Koppen long before the ARF was formed.

Although the propeller-quieting arrangement developed by the Foundation might properly have been used on the new airplane—since the information is freely available to all manufacturers—nevertheless Koppen elected to use different mechanical methods. He has used a two-blade propeller (instead of the ARF's selection of four) and has used an engine quieting arrangement called a "hush-box" which he patented several years ago. Both employ the basic noise reduction principles demonstrated by NACA.

A number of companies and designers were even then working on ultra-high-lift devices. Bollinger in his search for a marketable design discarded the best boundary-layer-control arrangement he was then able to find as being too complex. He thought roadable autos might have a future—but not soon—and even the low-cost helicopter appeared too far away from mass use. Willard Custer's channel wing is another proposed high lift device that has seemed to offer possibilities for the kind of safety and utility being sought.

(*Cont. on page 77*)

Side view of Helioplane shows flaps and leading edge slats extended. Big propeller turns only about 1,200 r.p.m., helps keep plane quiet. Bulge under nose and belly contains Koppen's "hush box" muffler.

Liaison pilot Dario Politella (in cockpit), Army combat vet, flies on weekends at Army expense to maintain his lightplane proficiency.

Weekend Grasshoppers...

Author signs voucher after flight. Army authorizes maximum payment of $8.50 solo, $10 dual.

Spare time flying course keeps Army liaison pilots in trim for military duty

By DARIO POLITELLA

First Lieutenant, Field Artillery Reserve

IN WORLD WAR II battle theaters, unarmed lightplanes were the eyes of the field artillery. Liaison pilots in the vulnerable little "Grasshoppers" spotted targets for the big guns in Africa. They took off from improvised baby flat-tops to guide the Anzio landings, flew overhead during the D-Day assaults, served on the front lines during the march to the Elbe and the peace. In the Pacific, they hovered over jungles to locate Jap concentrations for U. S. artillery below.

To do the job, the grasshopper pilots developed sharp dare-devil skills unlike those of the Air Force's fighter or bomber pilots.

They were the boys who knew how to handle the lightplane. They weren't technicians with years of high-powered experience; they were men grounded in the fundamentals of handling small craft found on every airfield in the U. S.

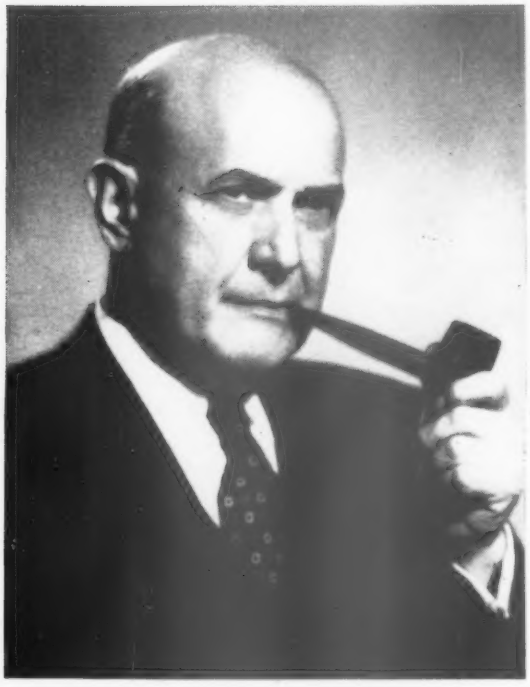
The Army does not intend to lose their combination of battle experience and lightplane flying proficiency.

Last year more than 1,000 liaison pilots took weekend "refresher" courses in planes similar to the rugged little craft they flew during the war. They did it to keep their touch, to sharpen the skills they already had acquired, or to work for advanced ratings.

This year, these same pilots and hundreds of other eligibles, will fly longer hours (maximum annual time has been increased from 48 to 100 hours) with the Government footing the bills.

My own case, I believe, is typical. I fly each Saturday and Sunday morning at Ward's Air Service, Syracuse (N.Y.) Municipal Airport. After a short hangar-flying session with (*Continued on page* 62)

The Paradoxical Mr. Johnson



Defense Secretary Louis A. Johnson, 58, was a prewar Assistant Secretary of War. He led fight for air power.

By JOHN A. GILES

The military's new boss can't be branded with any one label. He is tough, aggressive and a hard-boiled administrator.

ONE THING can be said with certainty about Louis Arthur Johnson's tenure as Secretary of Defense—it will be worth watching.

The big, bald, 58-year-old defense chief is tough, aggressive and even tactless. The startling abruptness with which he entered upon his new task—in direct contrast with the persuasion technique used by his predecessor, James Forrestal—has shaken the occupants of the Pentagon, from the top brass to the lowliest private.

But, like Forrestal, he will still have to cope with the interservice rivalries, and Washington wiseacres are wondering if his flying start, like so many others in the nation's capital, may not yet be grounded with a bump.

His success or failure will be gauged largely by the extent President Truman backs him up. It is no secret that Johnson has made some remarks that come pretty close to being a public threat to his subordinates that they must toe the line or be fired, and in any top drawer firing he'll need Presidential blessing.

While only time will tell, Washington observers are inclined toward the belief that the Johnson appointment augurs well for airpower and the Air Force in particular.

They point to Johnson's background and to his business connections. As assistant secretary of war before World War II, he pushed the B-17 *(Flying Fortress)* construction program. He has been a director of Consolidated Vultee Aircraft Corporation, maker of the huge B-36 bomber, on which the Air Force relies so heavily as "the plane of tomorrow." It should be said in passing that he resigned this directorship, as well as other business connections, upon taking office.

The "Cabinet" with which Johnson started had already begun to break up as FLYING went to press. Air Force Secretary Symington,

At the time of his appointment Johnson was described by President Truman as being in agreement with him on the adequacy of a 48-group Air Force as provided in the President's budget and it is not likely that the new defense chief will suddenly overturn Forrestal's "balanced team" of national defense. However, there is every indication that Johnson, like Winston Churchill, sees airpower as the weapon of the future and that he believes that the sea and ground forces will play an increasingly secondary role.

Since he was an insistent and effective advocate of heavy bombers when that was not a popular position and since it is well known that he has kept up an active air interest since he left office, it is most unlikely that Johnson will start in by suppressing the Air Force chiefs in their present unconcealed efforts to get more long-range bombers.

At any rate, his appointment appears to have caused more worry to the Navy than to the Air Force and there have been reports that the Navy's top officials greatly fear the vast concentration of defense power proposed for the secretary by the President.

A backward look at the Johnson record under President Franklin D. Roosevelt is startling even to those who recall vaguely that he fought to prepare the Army until Mr. Roosevelt sacrificed him to political considerations. The new secretary's prophetic attitude is the more remarkable since it came in the murky post-Munich period when few politicians showed vision and those who did, like Mr. Roosevelt, usually trimmed it to fit their political interests.

Johnson became Assistant Secretary of War in 1937. Late the following year the President made him chairman of a national defense power committee. Mr. Roosevelt heard its report and then announced that the administration and utilities would make peace because in case of war power shortages might develop in industrial areas and, for lack of munitions, our forces might be defeated. The New Dealers yelled murder; the pacifists ditto. But the plan went through.

Then Johnson urged upon President Roosevelt an expanded air force and passed word that Goering had more men working in a single airplane factory than the United States had in its whole airplane industry. Mr. Roosevelt was impressed; said that the National Youth Administration would train 20,000 airplane mechanics and pilots. Johnson said he ought to make it 200,000.

Meanwhile, he routed Army officers from their chairs and dispatched them to 20,000 factories for a look-see. He then designated 10,000 of these factories for future war purposes and had them taught how to adapt their facilities to defense purposes.

He began to press for a mass production airplane industry and pushed the B-17 program.

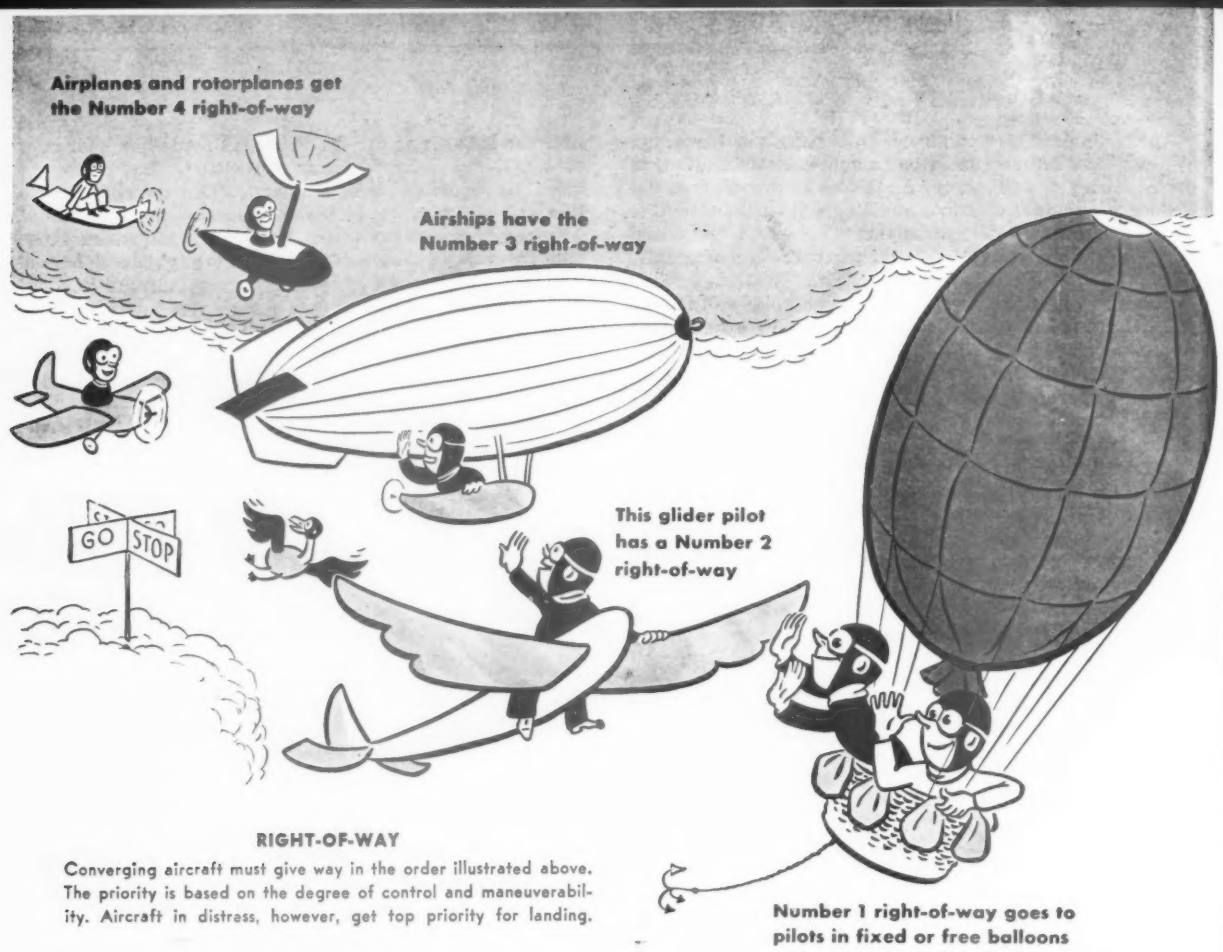
Crediting him with sincerity a liberal weekly moaned: "He is honest, he only wants to build as many planes as Col. Gen. Goering. He is envisaging a war equal to World War I; he does not even exclude the sending of a great citizen Army to fight in Europe or Asia."

By this time Secretary of War Woodring—whom Johnson called a "sincere pacifist"—was writhing; the isolationists were furious. President Roosevelt, knowing the score, had determined to get rid (*Continued on page* 72)

left, was restive, Army Secretary Royall had resigned, and Navy Secretary Sullivan, right, reportedly had asked to be relieved.

Johnson smiles as wife offers congratulations following swearing-in ceremonies at the Pentagon. The Secretary will direct activities of the three armed services from Secretary of Army Royall's former plush office.

Oath of office is administered by Chief Justice Vinson with ex-Secretary Forrestal as a witness.


Airplanes and rotorplanes get the Number 4 right-of-way
Airships have the Number 3 right-of-way
This glider pilot has a Number 2 right-of-way
GO
STOP
Number 1 right-of-way goes to pilots in fixed or free balloons

RIGHT-OF-WAY

Converging aircraft must give way in the order illustrated above. The priority is based on the degree of control and maneuverability. Aircraft in distress, however, get top priority for landing.

Traffic Rules of the Air

The essential air traffic regulations are easy to understand. Here's an explanation keyed to the appropriate rule in the CAR.

AS A PILOT, you are captain of your airplane. Like a ship's captain, you are in absolute command. Any decision you make in the interest of safety is final, whether you are flying an airliner or a tandem training plane. All the facilities that have been established to aid pilots are, in the last analysis, only aids. In no way do they force a pilot to take action against his better judgment.

But as a pilot, what kind of a captain would you be if you did not know the basic traffic rules of the air? What unnecessary and foolish risks would you not take for yourself, your plane and your passengers?

Studying the air traffic rules as they are found in Part 60, Air Traffic Rules of the Civil Air Regulations, is apt to be a tedious and difficult task. The "legalese" with which they are presented there inspire neither attention nor understanding. When learned at all, they are learned by rote and often soon forgotten. To explain the background of the Air Traffic Rules, the CAA has recently published a guide* from which this article is adapted. It is not intended as an interpretation of Part 60, but rather as an aid to understanding it.

60.0 GENERAL

60.00 Scope

All aircraft flying anywhere in the United States and its possessions are subject to compliance with the Civil Air Regulations. This includes military aircraft. When military operations require noncompliance with these rules, prior notice is given to the Administrator of Civil Aeronautics or his representative. With this advance knowledge, other air traffic can be planned and routed for complete safety. Operations which require deviation from the provisions of Part 60, such as air races or meets, dusting and seeding operations, are conducted under the

* Air Traffic Rules Guidebook, for sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Price 10 cents.

terms and conditions of a waiver issued by the Administrator.

60.01 Authority of the Pilot

The pilot of an aircraft is in absolute command of it. No hard and fast set of rules can be devised which will cover without exception all the conditions and circumstances with which pilots are confronted. An emergency may force the pilot to take action inconsistent with the rules for his safety's sake.

If a report of alleged violation is filed against the pilot, the Administrator requests the pilot to answer the allegation in writing, describing the circumstances. If the action is taken in good faith to escape hazard to person and property, no further mention is made of the incident (says the CAA).

When an emergency requires air traffic control to give priority to an aircraft, even though no deviation of the rules is involved, the situation is considered different because traffic may be disrupted with possible danger to others. In that case, the pilot is obligated to make a full report to the Administrator within 48 hours explaining why such priority was necessary. The information is supposed to help CAA prevent future similar occurrences.

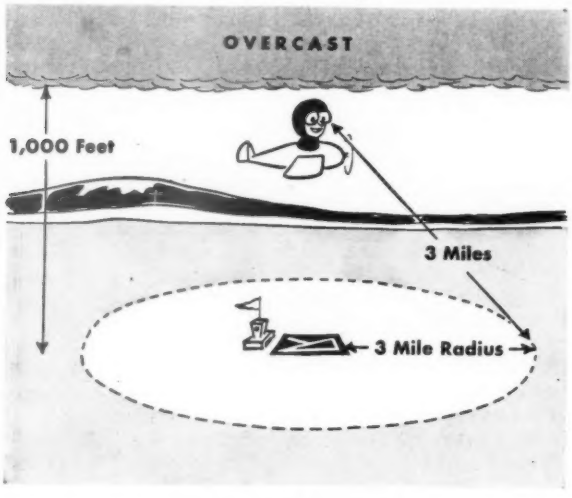
60.1 GENERAL FLIGHT RULES

60.101 Preflight Action

Every flight includes some sort of preflight action. An inspection of the plane may be enough for a local flight around the airport. A close study of weather map, airport facilities en route, fuel requirements, alternate courses of action, and so forth are necessary before starting cross-country. All this comes naturally to the experienced pilot and should be mastered by the inexperienced. A few minutes of planning before each flight may prevent many hours of grief.

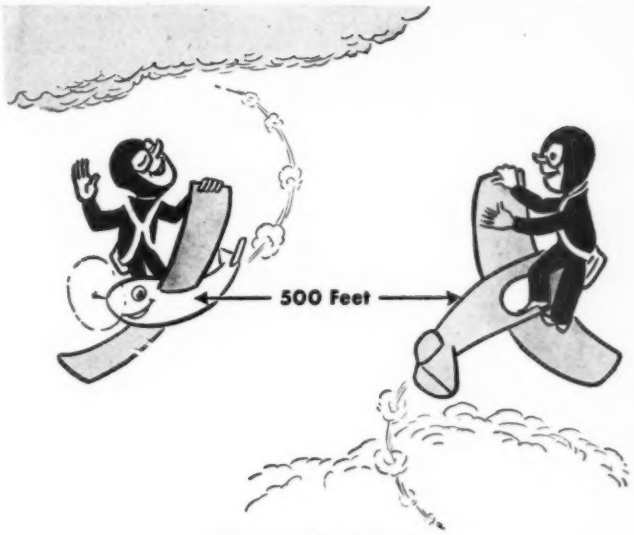
60.102 Careless or Reckless Operation

The rule says: "No person shall operate an aircraft in a careless or reckless manner so as to endanger the life or property of others." If all pilots could agree on what constitutes careless or reckless operation, this rule alone would suffice for entire Part 60. But because they can't agree, provisions have to be made for special conditions.



CONTROL ZONE MINIMUMS

Visible flight rule operation in control zones requires a minimum three-mile visibility and 1,000-foot ceiling unless authorization is received from air traffic control. See chart on page 66.



PASS ON THE RIGHT

When two aircraft are approaching head-on, it is the duty of each pilot to alter course to the right. When they are converging, the plane with the other on its right must alter course.

60.103 Air Space Restricted Areas

The Administrator designates as "danger areas" certain airspace where activities hazardous to air traffic are underway. These activities could be anti-aircraft firing practice, intensive instrument training, and so forth. The danger areas are plainly marked on aeronautical charts. Flight through them is restricted. If flight through them is necessary, prior permission from the agency having jurisdiction over the area should be obtained. Other areas, known as airspace reservations, are designated by executive order of President of the United States. Such a reservation protects the White House and Capitol in Washington, D. C., for instance.

60.104 Right-of-Way

With the steady increase of air traffic, the need for a regulated flow of traffic became obvious. Section 60.104 sets up right-of-way rules for several conditions of flight. Top priority is given to aircraft in distress in order to allow the pilot to land safely and quickly and with as little maneuvering as possible.

Aircraft converging must give way in following order: airplanes and rotorcraft to airships, gliders, and balloons; airships to gliders and balloons; and gliders to balloons. This priority is based on the degree of control and maneuverability of the aircraft involved.

When two or more aircraft of the same type or category are converging, the well known rule of "right is right" becomes effective, and the aircraft having the other on its right must alter its course.

When one aircraft tows another, the maneuvering ability of the tow ship is reduced considerably; therefore this type of aircraft has priority over any other aircraft having mechanical power.

When two aircraft are approaching head-on, it is the duty of each pilot to alter his course to the right so that the danger of collision is completely avoided.

An aircraft that is overtaking and passing another is obliged to alter its course to the right and give the overtaken aircraft right-of-way. This rule is eminently sensible because the pilot of the plane being overtaken is not likely to be aware of the other's (*Continued on page* 65)

The daring barnstormers who flew pre-1917 crates were a strange race of adventurers.

Swashbucklers OF EARLY AVIATION

By HARRY VAN DEMARK

One of last photos of Lincoln Beachey, showing him breaking his own loop-the-loop record, was taken by E. Carl Wallen from a flying boat at the Panama-Pacific Exposition in San Francisco, 1915. A few days later, Beachey began flying a new monoplane designed to give better acrobatic performance than his older biplanes. On one of his first hops, the wings crumpled 3,000 feet above San Francisco. Beachey, strapped in seat, was killed in the subsequent crash.

BETWEEN 1910 AND 1914 a strange race of adventurers appeared on the American scene—hard-faced citizens in checkered caps and Norfolk suits who herded together at the far end of the bar and talked about things ordinary men couldn't understand. They were professional aviators—the rowdiest adventurers the U.S. had produced since John Paul Jones, Andy Jackson, Kit Carson and John C. Fremont.

At no time were more than 100 of them flying—and of these, perhaps no more than 50 attained any fame.

But they considered themselves of God's annointed. The average clan member built his own plane by rule of thumb and flew it by instinct. He averaged three or four crashes a year, with various ribs and legs as routine damages—professional wear-and-tear so to speak. If he could still hobble into his plane after three years, he was considered an old master.

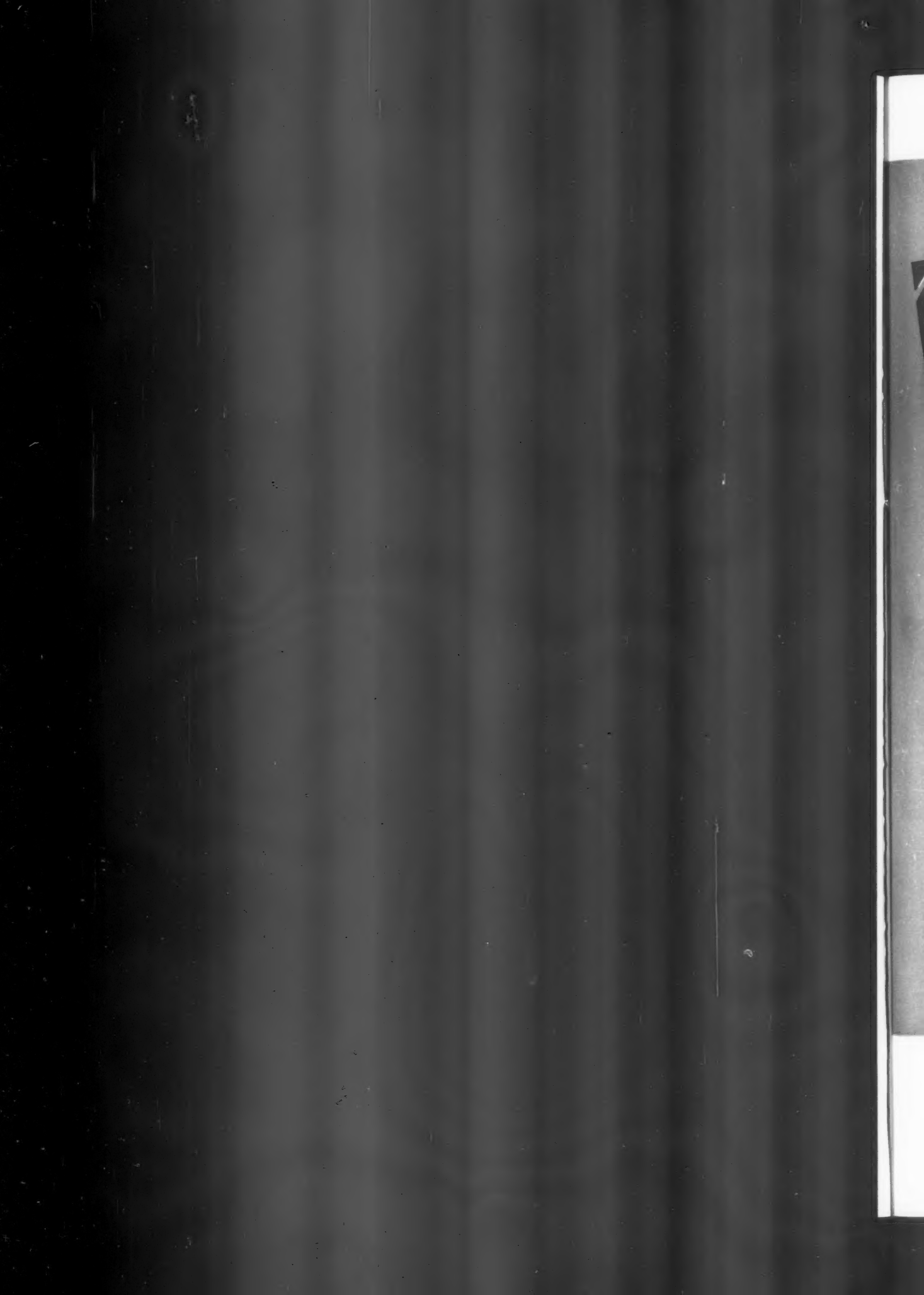
Few of the swashbucklers lived long enough to fly in World War I, but a number saw active service in Mexico. The first aviator to fly in armed hostilities was Hector Worden, well-known exhibition pilot from the Southwest. In 1911 Worden was hired by the Mexican Constitutional Government to try bombing and scouting from a plane. He was given a salary of $1,500 a month, U.S. money, and was commissioned a captain in the Madero forces, then seeking to overthrow the Diaz regime.

Worden had a Moisant monoplane with a Gnome engine rated at 50 h.p. Though the engine actually was capable of delivering only 36 h.p., it was in those days a cyclone of power. Main activity of the rebels was tearing up railroads and dynamiting bridges, so Worden elected to patrol the lines via air and drop bombs on suspicious persons or gatherings.

From 1,000 feet, Worden said later, it was hard to tell friend from foe. So occasionally he made mistakes, scoring bulls-eyes on all and sundry near the railroad tracks. Despite bullets that riddled his plane on several occasions, Worden was never wounded. But he lost his fervor.

After several months he resigned his commission and returned to his former occupation of exhibition flying in the U.S. Flying at a Dallas, Tex., state fair, he was seized with a heart attack while 2,000 feet in the air and died, according to medical evidence, before he struck the ground.

A couple of years later, Pancho Villa heard about airplanes and swore through his mustachios, *por Dios,* he



PHOTOS FROM A BARNSTORMER'S ALBUM

The "Boy Birdman," Art Smith (with his wife at San Francisco, 1915) startled crowds with night loop-the-loops, illuminated by fireworks. After 12 years of stunting, Smith was killed when his plane crashed.

Swashbuckling pilot DeLloyd (Dutch) Thompson was one of few early barnstormers to live past first two decades of American aviation. He was 60 years old when he died last January.

"Greatest of them all," Lincoln Beachey was making headlines as America's foremost pilot when this rare photograph was taken at Elkhart, Ind., fairgrounds. He was first to loop-the-loop in U. S., in 1913.

Plane versus auto was a hair-raising stunt when Lincoln Beachey and Barney Oldfield were pitted against each other in a series of exhibitions in 1914. Most of the races were close, and the airplane didn't always win.

would have some. The records don't reveal who sold him the hopeless pile of junk that was smuggled across the border—but there was scarcely a plane in the lot that would fly.

Most were old Wright Model B's—machines that even then were obsolete. They had the size and general configuration of a front porch. Twin-propeller biplanes, they were held together by a forest of struts and a network of wires. The victim sat on the lower wing with his feet jutting out in front of him. When the plane ran into anything, the ground for instance, the pilot got there first.

A crowd of U.S. pilots headed southwestward to the wars. Among them were adventurers with names like Mayes, Farnum, Fish, Rhineheart, Micky McGuire, Wild Bill Heth, and Borgenthal—most of them from Chicago. Mayes was killed in a collision with an adobe house. The details of McGuire's death are missing. Fish was shot while in the air, and his glide (*Continued on page* 64)

Low-priced four-placer cruises at 112 m.p.h., has top speed of 125 m.p.h. on 115 h.p. Lycoming. Gross weight of the Clipper (designated PA-16) is 1,650 pounds, empty weight 850 pounds. Span is 29.3 feet, length 20.1 feet, height 6.2 feet. Cruising range is 480 miles.

Instrument panel contains compass, airspeed indicator, tachometer, altimeter, ammeter, oil temperature, oil pressure gauges.

Cross-over exhaust system of the Clipper gives added horsepower through effective scavenging of engine's exhaust gases.

Piper Clipper

Lowest-priced four-place personal plane sells for $2,995.

FOUR PERSONS can now fly from Atlantic City to New York City and return, a round trip distance of 200 air miles, in less than two hours, for only $1 per person spent for gas and oil. The Piper *Clipper* which offers this performance is a four-place plane selling for less than $3,000.

This means that pilots, who because of initial cost have had to be content with slower two-place tandem ships, can now carry friends or family at cruising speeds well over 100 m.p.h. on less than seven gallons of gasoline per hour.

The Piper *Clipper,* which Piper also designates PA-16, is being merchandised like an automobile. If you want a plain model, without the trimmings, the standard *Clipper* is available for $2,995. For $100 extra, the de luxe model offers a fancy interior and paint job (extra coats of dope). From there, it's up to the customer. You can stop at $2,995 or $3,095 or go on for more.

Two-way Belmont radio, lights (navigation, instrument and cockpit) and wheel fenders are all available as optional extras. These accessories bear reasonable price tags in keeping with the amazingly low cost of the *Clipper.* Your own particular flying needs will dictate just which accessories you want. I think Piper wisely followed auto sales procedure by pricing the accessories as extras. A pilot who does not intend to fly after sunset will not have to pay for lights. Similarly, a rancher who flies the barbed wire compass doing fence checks does not need a two-way radio. The wheel fenders at $58.80 add a lot to lines and appearance and are equipped with a rubber step pad. The fenders allow plenty of room for even the highest chocks.

The Piper company also followed the precedent set by automotive engineers in design ratio. The *Clipper* is a small airplane, judging by outside measurements and appearance. Yet the interior is suprisingly roomy. Two six-footers are comfortable in either front or back seats and the seat width in front is better than in many two-place side-by-side craft. There are two doors, right front and left rear, for easy access to either seat. A 50-pound baggage compartment is located behind the hinged and removable rear seat. This baggage compartment can easily accommodate two husky suitcases.

Jim Mac Veigh, sales manager for Atlantic Aviation Service in Wilmington, Del., flew De Luxe Model Piper *Clipper* N 5213H down to Atlantic City on Monday, March 28. Atlantic Aviation, Piper distributors in this area, placed the plane at my disposal for an all day check flight.

I have always been inclined to discount enthusiasm by manufacturers, distributors and salesmen. It is their job to sell airplanes. After flying the *Clipper,* I needed no convincing. It sold itself. If the *Clipper,* priced at $750 per seat, did nothing but carry four people better than 100 m.p.h. on a little over six gallons of gas, it would be sales talk enough. Actually, the plane's performance with a 115 h.p. Lycoming engine is better than I had anticipated.

The wind was blowing 25 m.p.h. with gusts up to 35 when I taxiied out for take-off. Jim Mac Veigh pointed out the starter button, located under the front left edge of the pilot's seat. After that I was on my own. I asked one of the local pilots to ride along in the front seat with me because I wanted to test the *Clipper's* two-passenger performance.

The airport hangar doors were closed and the "No Flying" sign was up for the day because of the strong wind. This didn't stop the *Clipper.* I taxied out with no trouble. Cross wind, the plane didn't exhibit any leaning tendencies. This is probably due to the shock cord landing gear and short wing span. With the 25 m.p.h. cross wind on the ground, full rudder plus just a little brake (the *Clipper* has toe brakes) held the plane straight ahead. I experienced no difficulty in turning the PA-16 out of the wind while taxiing on the ground.

Visibility on the ground is good. I could see the runway only a short distance ahead of the nose, and on either side, even from a three-point attitude. The Lycoming revved up to 2200 r.p.m. on the ground. (Sensenich prop). I gunned the engine and exactly one minute later was at 800 feet, well past the boundary of the airport. From 1,000 to 3,000 feet the rate of climb averaged 900 feet per minute.

This rate of climb seemed about equal to that of the 90-h.p. PA-11. We had 27 gallons of gas aboard during the first take-off. Total gas capacity is 30 gallons. The safety advantage of a high rate of climb is apparent. You can reach a safe turning altitude by the time the *Clipper* crosses the far boundary of most airports. If engine failure does occur during take-off, it is possible to execute a 360° turn and get back to the airport from an altitude of 400 to 600 feet.

At 3,000 feet I checked the stall characteristics of the *Clipper* carrying two passengers. The buzzer connected with the Safe Flight Indicator (installed on all *Clippers* for $45 extra) had been removed for repairs. Jim Mac Veigh told me that it sounded a warning at 50 m.p.h. indicated air speed.

If this had been the case, the SFI would have buzzed at 5 to 10 miles above stalling speed in N5213H. With 1,500 r.p.m. (power stall) the airspeed needle fell all the way back to 40 m.p.h. (minimum reading) before the nose dipped slightly. With power on, the stall is really only a mild oscillation of the nose below and above the horizon. Because of bungee pressures, it is very difficult to hold the stick back all the way without using both hands.

Without power, the *Clipper* stalled at 45 m.p.h. indicated. The nose dipped abruptly but not violently and the pre-stall vibration gave ample warning of what was to come. Aileron control is good throughout the entire stall, with or without power. (*Continued on page* 70)

FLYING's CHECK PILOT

EDITOR'S NOTE

This series of articles is planned to help the pilot and prospective plane owner evaluate aircraft now on the market. Only aircraft holding a CAA Type Certificate are flown. The authors evaluate each aircraft through the eyes of the average private pilot who flies an airplane for business or recreation.

A FLYING Holiday

Private pilots can land at eleven airports near the nation's capital.

WASHINGTON, D. C.

By J. WILLIAM WELSH

THE HUCKSTERS in front of the White House are beginning to rub their hands and grin. "Well," they tell each other in off-moments, "the season's really here. Look at them flock into town."

The hucksters, whose stock in trade is a guided-tour of the nation's capital city and surrounding places of note, are speaking of the tourist season in Washington, D. C. Late spring, a deluge of tourists and wide grins on the faces of the barkers all appear simultaneously in Washington.

Actually, any season of the year is tourist time for Washington. For of all the scenic wonders and monumental areas in the nation, Washington stands out as the mecca, the national shrine of every American. It is the home of the nation's body of lawmakers, the spot where stand more edifices graced by more famous men in history than any other city in the U. S.

However, spring and the early summer are the best seasons to visit the nation's capital. Sooner or later you will come to Washington. Everyone does. It's been said, and justifiably so, that if a person stays in Washington long enough, he will meet everyone he ever knew. So you might as well come now while the weather is good, Congress is in session, and rain is just a topic of mild speculation.

Take a tip and come by personal plane. The greater Washington area, including a little better than 1,000,000 people, is well-stocked with airports and friendly aviation service bases made to order for the transient pilot.

Ten of the airfields within bus or streetcar distance of the White House are capable of handling all type planes up to and including a DC-3. Not only that, but the parking area for aircraft is, comparatively, much more abundant than for automobiles. The time saved en route when you come by airplane is nothing compared with the time you'll save by not having to scout, in the literal sense of the word, for automobile parking space.

Your transportation around Washington, to all the historical edifices and Government buildings you want to see, can be easily acquired from the Capital Transit Company, any of the several bus companies which serve nearby Virginia and Maryland at fees seldom exceeding 25 cents, or from our friends, the White House-stationed guides.

As for accommodations, it's a case of a stitch in time. It is always wise to arrange for (*Continued on page* 60)

From top of Washington Monument, the Capitol is clearly visible. Buildings facing Mall on left are National Gallery and National Museum.

U.S. Supreme Court Building

Washington Monument

President addresses Congress

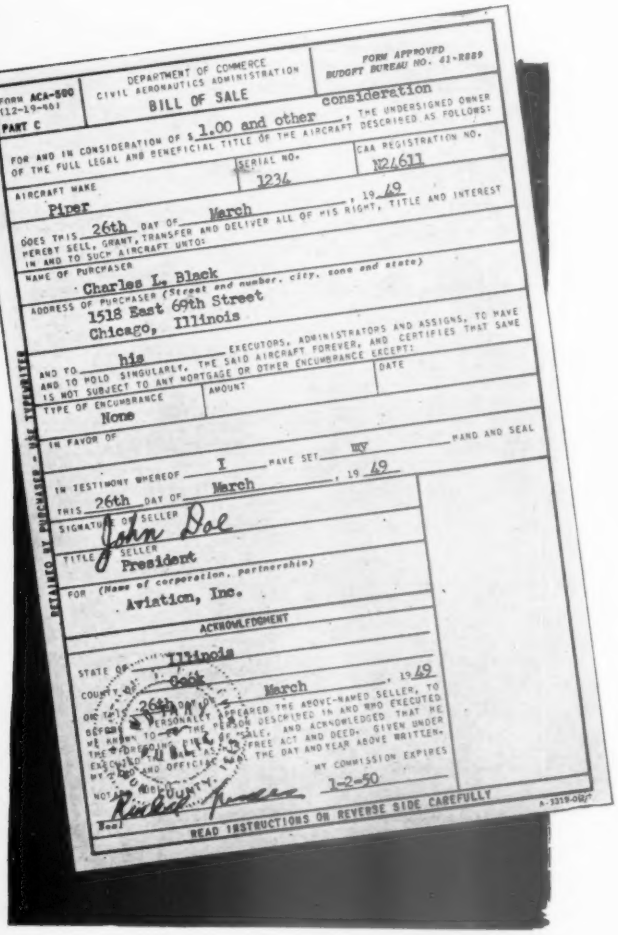
The Capitol

Washington National Airport

DO YOU REALLY OWN YOUR PLANE?

By BEN ROBIN

Though you paid spot cash and have a bill of sale, your title may not be clear.



FORM ACA-500 (12-19-46) PART C

DEPARTMENT OF COMMERCE
CIVIL AERONAUTICS ADMINISTRATION

FORM APPROVED BUDGET BUREAU NO. 41-R889

BILL OF SALE

FOR AND IN CONSIDERATION OF $ 1.00 and other consideration, THE UNDERSIGNED OWNER OF THE FULL LEGAL AND BENEFICIAL TITLE OF THE AIRCRAFT DESCRIBED AS FOLLOWS:

AIRCRAFT MAKE: Piper | SERIAL NO.: 1234 | CAA REGISTRATION NO.: N2611

DOES THIS 26th DAY OF March, 19 49 HEREBY SELL, GRANT, TRANSFER AND DELIVER ALL OF HIS RIGHT, TITLE AND INTEREST IN AND TO SUCH AIRCRAFT UNTO:

NAME OF PURCHASER: Charles L. Black

ADDRESS OF PURCHASER (Street and number, city, zone and state): 1518 East 69th Street, Chicago, Illinois

AND TO his EXECUTORS, ADMINISTRATORS AND ASSIGNS, TO HAVE AND TO HOLD SINGULARLY, THE SAID AIRCRAFT FOREVER, AND CERTIFIES THAT SAME IS NOT SUBJECT TO ANY MORTGAGE OR OTHER ENCUMBRANCE EXCEPT:

TYPE OF ENCUMBRANCE: None | AMOUNT | DATE

IN FAVOR OF

IN TESTIMONY WHEREOF I HAVE SET my HAND AND SEAL THIS 26th DAY OF March, 19 49

SIGNATURE OF SELLER: John Doe

TITLE SELLER: President

FOR (Name of corporation, partnership): Aviation, Inc.

ACKNOWLEDGMENT

STATE OF Illinois
COUNTY OF Cook
ON THIS 26th DAY OF March, 19 49 PERSONALLY APPEARED THE ABOVE-NAMED SELLER, TO ME KNOWN TO BE THE PERSON DESCRIBED IN AND WHO EXECUTED THE FOREGOING BILL OF SALE, AND ACKNOWLEDGED THAT HE EXECUTED THE SAME AS HIS FREE ACT AND DEED. GIVEN UNDER MY HAND AND OFFICIAL SEAL THE DAY AND YEAR ABOVE WRITTEN.
NOTARY PUBLIC
MY COMMISSION EXPIRES 1-2-50

READ INSTRUCTIONS ON REVERSE SIDE CAREFULLY

A-3319-(12)

Bill of Sale with no liens certified on the plane does not protect buyer. Even if seller fails to list loans or mortgages, the buyer is still responsible for payment of outstanding claims.

DO YOU REALLY own your airplane? That question sounds foolish, doesn't it? But maybe that plane you fly right now doesn't really belong to you. The fact that you've paid for it doesn't prove anything. Even an aircraft registration certificate made out in your name is insufficient. When the seller signs his name testifying that there is no lien on the plane, it isn't insurance that you really own the craft. Check your title.

During the past 10 years I have bought and sold several parcels of real estate. I always paid a title insurance company to institute a search and guarantee me a clear deed to each new property.

During the same 10 years, I have transferred title to several aircraft. I always paid cash for planes purchased. I made sure to see that the seller signed his name showing no existing liens on my new ships. That is as far as I went. It is probably as much as anyone else investigates. Let me assure you that it is a mistake.

Business was good during the summer of 1941. That Fall, I decided to buy two new lightplanes for my commercial operation at Atlantic City, N. J. I contacted the factory distributor for the area and made arrangements to pick up both planes the following day. He told me to bring a certified check and said that the bills of sale would be ready when I arrived. I flew up to the distributor's field with two of my students. Both students were ready for a cross country flight and I decided to let one of them fly back in each of the two new planes. The distributor was happy to see me and his eyes brightened a little when I passed over the certified bank check for $3,100. The year 1941 was B.H.P. (before high prices). He notarized the two bills of sale and gave them to me for mailing to the CAA. They appeared to be in order. Under the space reserved for liens, if any, the word "none" had been typed in. The factory distributor's name was signed on each document.

The flight back to Atlantic City was a pleasant one. I was happy with my two planes and put both to work immediately after checking them mechanically. I used both planes the balance of that year until just after the Japs bombed Pearl Harbor. Private flying was curtailed along the coast a short time later and I sold all my equipment. One of the two planes went to a former student of mine. He hangared it farther inland. The student paid me in cash and I gave him the usual bill of sale. I certified no liens, in the space provided, and signed my name to the document. This student flew the plane for a year. When wartime flying restrictions extended across the country he decided to dispose of it. He sold the plane to a private pilot in Pittsburgh, Pa. The transaction was again in cash, with the usual bill of sale changing hands.

I had joined the Air Corps and was stationed at an Air Transport Command base near Wilmington, Del. A letter arrived one morning from an Atlantic City lawyer who wanted to know why I had cheated his client. The client was my former student and the matter in question was the plane I had sold him. This letter arrived in October, 1943, two years after I had originally purchased the plane.

This is what had happened. The factory distributor had been hard pressed for cash when I bought the two planes. He had borrowed money on them from a loan company. When he sold them to me he had certified that no liens existed. I sold one of the planes and certified the same thing. My student had done likewise. Now, two years later, the loan company had located the plane in Pittsburgh and threatened to repossess it unless a lien of $1,800 was satisfied. Naturally, the present owner was innocent. He came back at my student. My student was innocent. He came after me. I was innocent, so I came looking for the distributor. He had disappeared.

I hired a lawyer. He had bad (*Continued on page* 70)

HAVE YOU SEEN?

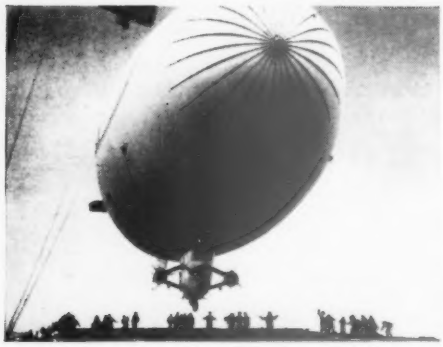
Northrop XF-89 (Scorpion) is going into initial production for the Air Force, with 48 on order. The all-weather fighter's speed is in "600-m.p.h. bracket" and wing tip tanks extend range considerably. Twin-jet craft has elaborate radar installation for night fighting.

Another night fighter is black-painted F-82 with electronic equipment housed in radome slung from wing center section.

Republic F-84 was apparently only model built with unusual radome slung from fuselage. Radome resembles that of F6F.

Parachute unfurls to cut landing run of Boeing B-47 as its wheels are about to touch down. Germans innovated use of parachutes to slow jet bombers in the Junkers Ju-287 (see April FLYING, page 24). The B-47 is going into limited production at Boeing Wichita.

HAVE YOU SEEN? *continued*

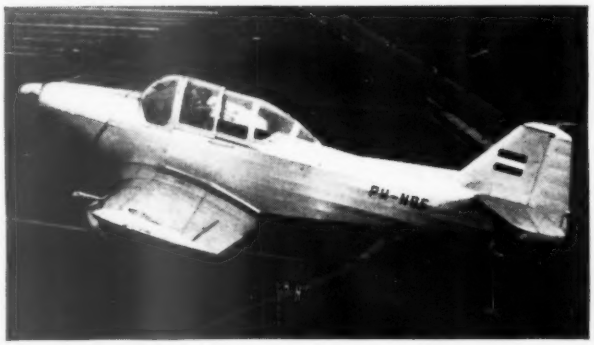


Blimp lands on carrier during Caribbean maneuvers for armament, fuel and stores replenishment.

Piper Crop Sprayer is factory version of 90-h.p. PA-11 Cub Special. Twelve nozzles on each side spray liquid pumped from tank slung between landing gear.

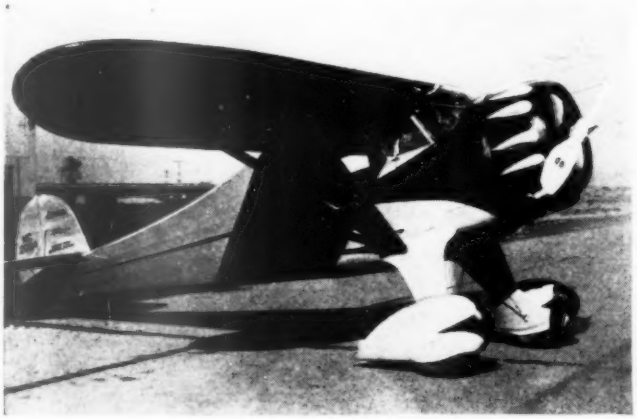
Aeronca's 1949 Champion has 90-h.p. engine which adds to short take-off and steep climb performance. Company believes plane is especially adaptable for agricultural spraying. It cruises at 95 m.p.h. All 1949 Aeroncas are equipped with stall warning instruments.

Surplus PT-19 was modified by Rawdon Brothers Flying Service, Wichita. Modifications increased top speed 28 m.p.h. to 151 m.p.h. as follows: enclosure added 6 m.p.h.; wheel fairings 10 m.p.h., Beech controllable propeller, 6 m.p.h.; engine modifications 6 m.p.h.



Foreign trainers are Fokker S.11 (Instructor), above, a two-place side-by-side Netherlands design, and the De Havilland Chipmunk, right, which will replace Tiger Moths at all RAF Reserve schools.

Fairchild T-31, which originally was designed as a Navy trainer (the XNQ) will be bought in quantity by the Air Force as its new primary and basic flight trainer. The T-31 has a functional safety cockpit with a simplified arrangement of instruments and controls.



New Monocoupe Clipped Wing Special has a Warner 200-h.p. engine, 23-foot span, cruises at 175 m.p.h., has top speed of 200 m.p.h.

Bell 47D1 is 150 pounds lighter than 47D and can carry three persons. Price has been reduced to $23,500.

Lieut. Charles Konigsberg flew the Hump for a year, then joined a P-61 squadron in the Pacific. After the war, Konigsberg went back to Casablanca to marry a girl he had met there. He is now attending Harvard University.

I Learned About Flying From That! NO. 115

By CHARLES KONIGSBERG

A 2,400-foot hill ahead—with the pilot in a trance!

WHEN I shuffled through my flight log recently I found an 11-word notation under "remarks" that contains a lesson every flyer should learn. The words were written after a flight across the Hump in June, 1944—on what almost was the last flight I ever made.

The notation sounds routine: "First night take-off loaded; instrument let-down at Chanyi; 'North Pass' let-down!"

It was during the monsoon season, and I was being checked out as a first pilot on the Hump run. When we landed in China we were dog-tired and our eyes were bleary after flying instruments all the way across—bucking turbulence in our heavily-loaded C-46 and plotting the exact instrument let-down into the field among the mountains. But we had to be off the ground in an hour, bound back for our home base at Mohanbari, Assam. That was regulation on all Hump trips except when mechanical trouble kept us grounded.

Shortly after take-off, we found ourselves again in the soup. This time I had shifted over to the co-pilot's seat, with the check pilot taking over. He peered ahead, trying to spot a hole through the billowing monsoon mists. We wanted to fly contact or on top so we could relax.

But there were no holes. We approached the last range of mountains that cuts off the Assam Valley from the Hump and the country to the east. Then, suddenly, we broke out between two layers of overcast—and ahead, through a hole in the mist, we could see the ground.

As we neared the cleared area, we saw it narrowed into a pass—or steep valley—that apparently angled into the Assam plain. Ahead we could see the overcast seemed to be lowering, but the pilot elected to stay contact. After endless hours on instruments, he decided to fly down the pass, under the overcast.

Within minutes, rain began pelting the plane, restricting visibility. With the lowering ceiling, we had to drop nearer the ground. Eventually we were roaring along only a couple hundred feet above the treetops. The whole business seemed hardly more "relaxing" than instrument flying to me, and I suggested that we pull up out of the pass and return to the gauges. The pilot stared straight ahead. He didn't turn his head—and he didn't change course. He acted as though he hadn't even heard me.

The rain came down in blinding sheets, the overcast inched downward, and the canyon walls seemed to press close on the plane. I was tense; and when I began to catch glimpses of treetops flashing past just under the wings, I became genuinely alarmed. Again I looked toward the pilot, who—at this point—seemed almost in a trance. He sat in exactly the same position as before, his hands tightly gripping the wheel, his eyes staring straight ahead. Apparently he hadn't even heard my suggestion of a few minutes before. He seemed almost hypnotized by the danger, as though he had chosen (*Continued on page* 50)

It gives the Cutlass an edge

A heavy, super-fast ship like the Navy's new XF7-U tailless twin-jet fighter needs a plus in rugged landing-gear equipment. That's why it is fitted with Goodyear tires, tubes, wheels and brakes. The extra stamina of Goodyear tires and tubes—the extra strength of Goodyear lightweight magnesium alloy wheels—the extra braking power of Goodyear self-adjusting Single Disc Brakes—give the Cutlass a decided edge in safety in making quick, sure stops. For complete information about these and all other Goodyear Aviation Products, write:

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AOPA NEWS

Aircraft Owners and Pilots Association is a service organization for the private pilot or aircraft owner. AOPA's full time staff is devoted to helping the individual pilot. Its aim is: "To make flying more useful, less expensive, safer and more fun."

Headquarters are: 15th and New York Aves., Washington 5, D. C. Members also receive a special AOPA edition of FLYING, newsletters and confidential aviation data. Opinions expressed in this column are not necessarily those of FLYING MAGAZINE.

OMNI TESTS

Forthcoming tests of omni equipment—both airborne and ground—will include a representative group of the newest airborne omnis for personal planes. This phase of the Air Navigation Development Board's evaluation program is being handled by AOPA's representative on the working committee of ANDB.

Present plans call for as many as six types of omni receivers for personal planes to be tested at the three test sites: Patuxent, Md.; Phillipsburg, Pa.; and Salt Lake City.

Planes carrying personal plane omnis will be flown by private pilots, and results will be sought to show the accuracy obtainable with the equipment by average pilots.

OMNI MANUAL

And speaking of personal plane omni, AOPA's concerned about the number of private pilots who know nothing whatever about this new navigational system all of us will be using within the next year or two. So AOPA now is preparing a private pilot's manual on omni with as many of the big words and technical headaches eliminated as possible. No available date set yet; it's a tedious job getting it written, then checked by omni experts all over the country. But the first draft is done, so the announcement will be out shortly.

FOREIGN FLIGHTS

The volume of foreign flights being made by AOPA members has increased at such a pace that national headquarters has established a foreign flight department. This department is now equipped with the latest aeronautical charts of the entire western hemisphere and has systematized the entire procedure necessary for procuring foreign flight permits, visas, clearances, etc., for AOPA members. Members planning to fly their planes to any country outside the United States now can get help from national headquarters.

DISCOUNTS

National headquarters now is conducting a study to determine how much money per year can be saved by AOPA members who take advantage of the many discounts offered AOPA by a large number of business firms throughout the country. The study was inspired by a number of members who have written national headquarters to tell us that they have saved several hundred dollars in purchases during the past year.

VISIBILITY

First test photographs of the all-around visibility of a personal plane have been delivered to AOPA by the CAA Experimental Center, Indianapolis. Using a special camera developed specifically to measure visibility photographically, CAA technicians used a *Navion* for their first test.

The CAA's first tests with the camera have indicated the need for a smaller unit for personal plane work. The present camera is too large for all but the larger personal planes. A smaller camera installation now is under development at the Indianapolis center. This project is being encouraged by AOPA in the hope that it will help establish minimum standards of visibility for personal planes. (See photo below.)

SPINS OUT?

Indications now are that spins definitely will be eliminated from the private and commercial pilots' flight tests. AOPA expects the new regulation will place considerable emphasis on stalls and stall recovery. This was the trend of the thinking at the recent regular meeting of the Non-Scheduled Flying Advisory Committee, of which J. B. Hartranft, Jr., AOPA general manager, is a member.

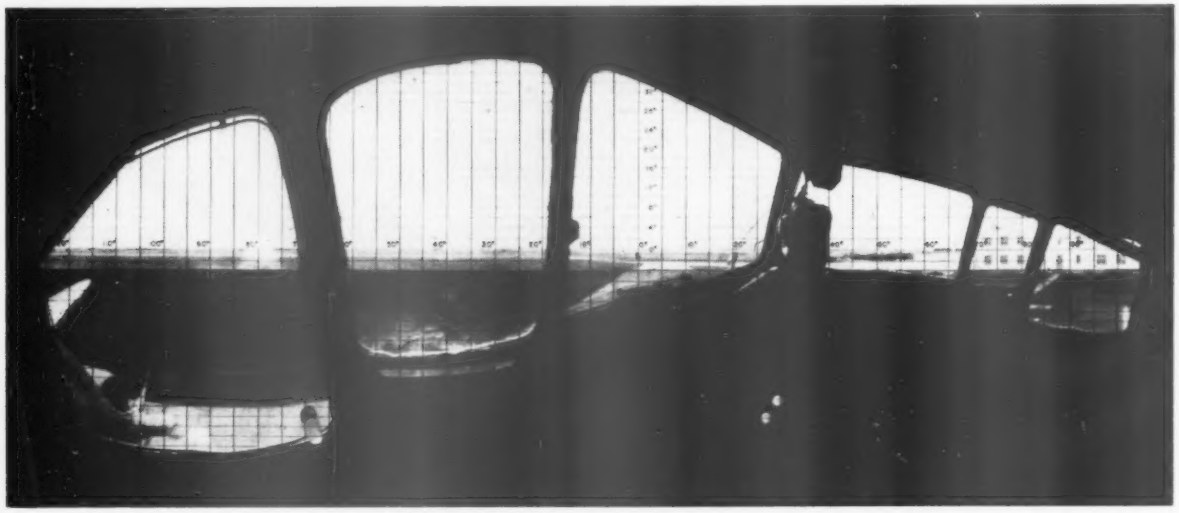
HOME DUSTERS

Can a flying farmer dust his own crops with his plane? This question has been raised in Washington aviation circles by AOPA and the answer appears to be:

The CAA will continue its present system of issuing waivers to flying farmers requesting them, providing they meet CAA requirements. Other than that, CAA does not claim jurisdiction. Difficulties currently being experienced with the drifting of dusts and spray onto other farmers' crops are regarded as being under Department of Agriculture supervision.

NEW MAP SERVICE

A new service whereby AOPA members can subscribe to the aeronautical maps they need is being set up by AOPA headquarters. Up-to-date maps will be available at all times at list price. END



Cockpit visibility from DC-3 is measured by superimposing grid upon photograph made from airplane. Where the two zero lines cross is the point where pilot's eyes normally are centered when he is sitting in seat. With this system it is possible to measure visibility from any plane. AOPA is encouraging CAA tests of current lightplanes in the hope they will lead to establishment of minimum visibility standards.

NO. 36 IN THE SERIES FEATURING PROMINENT ESSO AIRPORT OPERATORS

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1 ***"BECAUSE OF OUR CONFIDENCE** IN ESSO PRODUCTS WE DECIDED ON ESSO AVIATION FUELS AND LUBRICANTS EVEN BEFORE OUR PRESENT MODEL HELICOPTER WAS READY TO FLY."*

George Townson, Test Pilot (Left)
Helicopter Engineering Research Corp.
Philadelphia, Pa.

2 ***"THOSE ESSO WINGS** ARE A WELCOME SIGHT TO ME. I'VE USED A PLANE FOR SEVERAL YEARS—FLYING ALL OVER THE EAST...AND I'VE NOTICED MANY OF THE AIRPORTS THAT PRIDE THEMSELVES ON GIVING SERVICE BACK IT UP WITH ESSO AVIATION PRODUCTS."*

James R. Affleck (Center)
William Penn Flour Mills Co.
Philadelphia, Pa.

3 ***"15 YEARS AGO** I CHANGED FROM 'SPORTSMAN FLIER' TO 'COMMERCIAL OPERATOR'... AND ESSO HAS BEEN MY FIRST CHOICE RIGHT FROM THE START. TODAY, I FEEL ESSO AVIATION GASOLINE AND OILS HAVE CONTRIBUTED GREATLY TO OUR HIGH SAFETY RECORD AND LOW MAINTENANCE COSTS FOR FIVE YEARS, AND OVER 50,000 HOURS OF C.P.T. AND W.T.S. PROGRAMS. WE NOT ONLY SELL ESSO AVIATION PRODUCTS AT OUR FIELDS... WE URGE OUR CUSTOMERS TO STOP AT FIELDS WHERE THEY SEE THE ESSO SIGN."*

Richard Bircher, Airport Operator (Right)
Boulevard Airport
Philadelphia, Pa.

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SUPERSONIC JITTERS

Our supersonic boys have gotten the jitters. And they have good reason, too. They are not saying anything, with the exception that they have gotten into the habit of talking to themselves as they walk along, but your leg man has had, to use a fine aeronautical term, wind of what the turmoil is all about.

The jet supersonic planes have been stopped in their tracks, and by one of the darndest mysteries of years. This is all secret, of course, known only to intelligent people and the Russians—no, it's Top Secret, I guess, because Drew Pearson probably knows it too.

What's this here mystery?

A great many years ago the scientists announced that the stratosphere had no clouds, no moisture condensation, no disturbing influences of any kind, and so the air at the higher levels was as smooth as a sophomore in a coupe.

Then along came the rockets whose flights had to be pre-set and it was found desirable to determine what densities, pressure, temperatures, and air mass drifts, and their changes, were up there where birds fly not and only fancies range.

And the truth? Well, the truth is that the lofty realms are about as placid as two red-heads and a Marine. The scientists sent up stratosphere balloons with apparatus that would record, and even broadcast, the information.

Piecing out the tatters of information that your reporter was able to ambush, it seems that a balloon will be riding sweet and smooth for awhile, and then it will suddenly go scooting up or down or sidewise, bouncing around like a bustle in a rumba. Sudden changes of pressure are recorded. The fact is that the stratosphere is by no means serene; it is full of areas of severe turbulence. Why? No one has the faintest idea.

Such bumps, of course, don't go around with any signs on them; they are quite invisible, and it is impossible for a jet pilot to avoid them. Everything else being equal, the higher the velocity of the airplane, the harder it is shocked by a given bump. Roughly this is a square function. If a plane goes twice as fast, it hits a given bump four times as hard. At sonic and supersonic speeds it is readily seen that you can get fetched some gorgeous wallops.

The experts don't think the men, the pilots, can stand it. So if you were sort of planning to go belching around through the stratosphere like an ardent meteor during the next few years, or the next war for that matter, you can go back and finish your comics—you won't be doing it.

It is beginning to be pretty clear, what with atoms and bacteria and supersonics and such, man has made about as much progress as he can stand. We are going to have to have a new kind of man right away, a kind of man of infinite durability or one who can behave himself.

* * *

SHAKESPEARE ON FLYING

Warning Signal

The horn, the horn, the lusty horn
Is not a thing to laugh to scorn.
—As You Like It. Act IV, Scene 1.

* * *

TAKING STOCK IN THE AIRLINES

The CAB has announced that it is going to let the taxpayer make up the recent losses of the airlines. No wonder airline stock has been going up. It sure is a good business where if you make a profit you keep it, and if you have a loss the Government will give the money back to you.

That's not quite the way it is with the private operator. If he makes a profit the Government will let him keep a little of it. And the Government would never think of depriving him of his losses.

* * *

FAMOUS SAYINGS

This is where I came in.
—*Airline meal.*

* * *

Sadie was lecturing to a class of student stewardesses when one of the new dopefuls asked her, "What is a tossed salad, anyway?"

"In this business," Sadie replied, "they should be dodged salads."

* * *

It said that Dr. Kinsey holds to the opinion that the real reason that Adam left the Garden of Eden is that he wanted to turn over a new leaf.

* * *

MONTHLY EPITAPH

He flew on the airways;
His flying was deft,
But he didn't keep right—
This is all that is left.

I Learned About . . .

(Continued from page 46)

his course and was temporarily incapable of taking an alternative or even of evaluating our situation.

Hastily, I grabbed a map and located the pass we were following. Immediately I spotted on the map a 2,400-foot hill just where the pass opened into the broad Assam valley. I reached over and shook the pilot's shoulder, thrust the map, with my finger pointing to the hill, into his face. He looked at it, but didn't respond. I immediately pulled hard on the wheel, following with a shove on the prop controls and throttles for climbing power. We were on instruments within a few seconds.

Before starting our pull-up we had been at 1,200 feet. In about three minutes, three things happened simultaneously: (1) We reached an altitude of 2,600 feet, (2) we broke out into the clear, and (3) we found ourselves exactly over the mouth of the pass with that 2,400-foot hill just below! Had we started climbing 30 seconds later we'd have crashed directly into the side of the hill.

The lessons contained in that experience are obvious, and are just as good today as they were that night five years ago.

Over mountainous terrain, especially the sort we encountered over the Hump, stay well above the known elevation of the highest peaks on or near course. The rule is good in clear weather, and it's especially important when conditions are bad.

Before attempting any sort of change in flight plan or course, always check your map. Had we taken this precaution before descending into the pass we'd probably have saved ourselves a few gray hairs.

The most interesting lesson I learned, however, is one that concerns what I believe to be the psychology of flying. In his behavior prior to our pull-up, the pilot demonstrated a common reaction of flyers to dangerous and uncertain situations involving unfamiliar terrain. This reaction, especially common when flying on instruments, is the tendency to stick to a decision *regardless of its possible dangerous potentialities*. The pilot finds himself equally afraid of all alternatives. He is over unfamiliar terrain. He can't see the ground. And he knows that any movement might bring trouble. In our case, the only obvious solution was to pull straight up—as we finally did. But the point I am making is that there arises the tendency (almost a fixation) to regard *all* alternatives, even the obvious, as bad. I believe this is caused because the pilot *knows he is still safe*. He apparently has a tremendous incentive to stay where he is and this precludes a true evaluation of alternatives, as in the case of my pilot in this experience over the Hump.

In those few seconds I became convinced that pilots need to develop an important *mental habit*. They need constantly to re-evaluate their positions in the air. They need constantly to plan alternatives should the going become too uncertain. END

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State.....Phone No.....

Record Flight

(*Continued from page 27*)

some annoyance I noted that clouds were forming and spreading rapidly over the entire valley. Avoiding an area of likely downdrafts on the mountains southwest of me, I glided east toward Bishop Airport. Thickening frost on the canopy remained a constant source of irritation and kept me busy scrubbing holes in order to see out.

When I reached a point a few miles south of Bishop, I had the choice of landing back at the airport where I was expected, or of gliding south where the wave might still be active. I apparently had enough altitude to fly to Independence Airport, about 40 miles south. A landing there would require that the glider be retrieved by car and trailer, a glum thought—but I had come 300 miles to enjoy some wave soaring and didn't feel like withdrawing so easily.

Utilizing several thermals to regain altitude along the way, I arrived over Independence shortly after 2 p.m. The Sierra Nevadas were blanketed with clouds. Driven by the strong west wind, they were spilling over and dissipating into the valley. I was now able to aim in the direction of the roll cloud which I had spotted from Bishop earlier in the day. This particular cloud lay four or five miles downwind of the Sierras, and extended approximately 25 miles along the range. The cloud was an indication of the much sought after standing wave condition. Often there is no cloud with a wave action, and pilots of small and large aircraft fly through strong lift or downdrafts without recognizing the cause or form.

A standing wave is an atmospheric phenomenon caused by a flow of air mass or wind of sufficient velocity over a mountain range, comparable to the rapid flow of water over a boulder. If the velocity and depth of water are adequate, a series of ripples or waves are formed. They are stationary in relation to the boulder, but trail off downstream with crests and troughs of diminishing amplitude and increasing wave length. There may be only three or four waves or "bounces," or sometimes more than a dozen.

Waves thus formed in the air cause a variety of clouds and sometimes go to amazingly high altitudes. Lenticular clouds, often recognized by their "eyebrow" or lens shape are evidence of this wave action. The roll cloud is a cumulus of a special type. But it and the lenticular are formed by moisture condensation in part of the upsurge of air in the wave. Since the moisture dissipates as the airstream flows down on the back side of the wave, the cloud remains nearly stationary in relation to the ground, while the wind actually blows through it. It is not unusual during such a condition to see a roll cloud topped by several lenticulars. Ordinary cumulus clouds drift with the wind, as they are formed by thermals or updrafts which are short-lived and move with the air mass. Standing waves have strong updrafts on the upwind side of each bounce and equally strong downdrafts on the downwind side. The updrafts are usually smooth but often there are areas of extreme turbulence around the entire outer fringe of the wave.

Since I was gliding south in the Owens Valley, while a west wind blew over the tops of the 13,000-foot Sierras, I hoped to locate the first bounce, which would be the highest, without hitting any of the lesser ones. The big question was: Could I get there with enough altitude to find the lift? I had reached a new low point of 9,300 feet and was back up to 10,000, gliding southwest toward the gap between the roll cloud and the mountain range. This was where I expected to find the area of lift. Through a disgustingly small clear spot which I had rubbed in the frosted canopy, I strained my eyes in an effort to find the Independence airport.

Suddenly, with shuddering violence, the plane was jerked out from under me. The already tight safety belt yanked me down with it, but not before my head hit the rear portion of the canopy with a resounding whack that broke the panel. One of the barographs tore loose from its moorings, and the thermos bottle bounced on top of my shoulder instead of under my arm. I grabbed the thermos as the ship kicked me in the seat, hard, going up—and then tried to leave me, going down again.

The sunlight streamed in brightly through the frost and I had little difficulty controlling the *Zanonia*. I kept the airspeed within bounds, maintained a southwest heading, all the time being uncomfortably buffeted and manhandled by this heavily armed opponent. I have flown inside many thunderstorms and they are mild compared with the churning action below the wave proper.

But I was averaging climb in this violent agitation and that is what counted. Abruptly, and surprisingly, the violence ceased completely. The pellet on the up side of the variometer hit the top at 2,000 f.p.m. plus. The air became velvety smooth. There was only one direction—up! This was the fabulous "first bounce" of a standing wave, so strong, uninterrupted, and tremendous you can't believe it until you've been in one!

Changing the heading to west, right into the wind, I scratched away at the wearisome hole through the frost and peered out at cloud and mountain rapidly dwarfing below me as the 2,000 f.p.m. up continued. After a quick gulp of lemonade, I turned on the oxygen tank and had the mask operating at 16,000 feet. Then I settled down to a maximum of observation and a minimum of physical exertion in order to stretch the oxygen supply, estimated at three hours duration.

After 20,000 feet, the climb gradually slowed to 1,000 f.p.m., while the wind became stronger and more northerly as I continued to face into it. When the cockpit thermometer dropped to 40° the gloves went on. Though the outside temperature was below zero the insulated interior remained relatively warm as long as the sun shone. I made progress westward until over the high mountains where the lift ceased. Then I turned east and continued to climb for a short time. Losing the lift again, I turned west once more, thus being able to bracket the lift region, though it was growing weak. At 29,000 feet it disappeared. It was then 3:15 p.m.

Temperature inside dropped to 10°. The infuriating frost grew so thick it was difficult to clear even a small spot, but the limited view had its rewards. To the northwest a high peak stuck out of the solid cloud bank covering the Sierra Nevada. Westward, across the range and

15 YEARS AGO

FROM the June, 1934, issue of this magazine:

The House Military Affairs Committee revealed that only 300 to 400 planes could be mustered by the Army Air Corps in an emergency.

Pilots planning to fly over the Sahara Desert had to deposit 100,000 francs with the French government to be used if the flyers were forced down and subsequently held for ransom by marauding Arabs.

The "Backyard Flyer," a circular-winged monoplane (below) designed by

Chicago engineer Paul Nemeth, was powered with a 125-h.p. Warner engine, cruised at 95 m.p.h. and had a top speed of 120 m.p.h. Most amazing feature of the strange-looking plane was its low landing speed—20 to 25 m.p.h.

Night flying for Army pilots was strictly banned except in emergencies.

A film titled "The Eagle and the Hawk" starred Frederick March and Cary Grant as World War I aces.

Rockets for assisted take-offs were being perfected by the Junkers plant in Germany.

The Lockheed Electra "flashed across the sky at an air speed of 221 m.p.h." to establish a new unofficial world speed record for twin-engined transport planes.

An advertisement of the Universal Aircraft Company, Ft. Worth, Texas, offered: "New production ships $98.00 each. We will lose money but we are gathering data on how cheap we can build a dependable single-seater trainer . . ."

TWENTY YEARS AGO

Brig. Gen. William (Billy) Mitchell complained that "we still tie our air power to an Army and a Navy instead of organizing it into a separate department, untrammeled by training, jealousy, and pork barrel politics."

THE SHOT THAT COUNTS

Cal-Aero Technical Institute's up-to-the-minute training hits the bulls-eye... it is accurately directed to provide a thorough foundation for your AVIATION CAREER.

Learn AVIATION

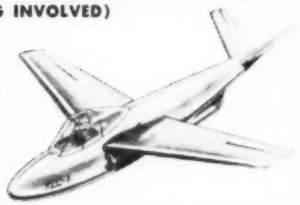
AN ESSENTIAL INDUSTRY IN PEACE OR WAR

CAL-AERO SPECIALIZES IN

AERONAUTICAL ENGINEERING • MASTER AVIATION MECHANICS

(NO FLYING INVOLVED)

MAXIMUM TRAINING IN MINIMUM TIME . . . with "live" modern training equipment, including helicopters, jets, rockets, wind tunnel and other aircraft devices. The courses are intensive, complete, interesting and highly concentrated, with non-essentials eliminated. Established in 1929, "Cal-Aero" is one of the oldest and largest aeronautical schools in the world. It is located on its own huge airport, Grand Central Air Terminal in the Hollywood-Los Angeles Metropolitan Area, in Glendale, in the heart of Southern California's giant Aircraft Industry. Over 7000 successful civilian graduates in addition to 26,000 pilots and 7,500 mechanics trained for the British and U. S. Army Air Forces.



CAL-AERO STUDENTS ACTUALLY DESIGN ORIGINAL MIDGET JET PLANE. IN ADDITION THEY HAVE DEVELOPED AND ARE BUILDING ITS JET POWER PLANT.

This actual development of a forerunner of possible future jet powered personal planes, is only a part of our modern streamlined training program that prepares "Cal-Aero" graduates to step directly into the best pay jobs—**"Cal-Aero" graduates are in demand.**

CAL-AERO'S JET AND ROCKET LABORATORY IS ONE OF THE MOST COMPLETE IN THE COUNTRY

CAL-AERO IS APPROVED BY—National Council of Technical Schools, Civil Aeronautics Administration, California Board of Education, U. S. Dept. of Justice, Immigration and Naturalization Service and the Veterans Administration. In addition Cal-Aero's Engineering Curriculum is approved by Engineers Council for Professional Development.

WE HAVE THE EXPERIENCE—THERE IS NO SUBSTITUTE FOR IT

Board and Room available right here on Grand Central Airport—transportation is no problem, this saves you money.

EST. 1929

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APPROVED FOR VETERANS

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Check one: ☐ Veteran ☐ Non-Veteran

F-6

FLAT SPINS

FLYING THE BERLIN CIGAR-LIFT

•

A SHORT BEER FOR THE 'COPTER PILOT

•

THE NAVY WARS ON BUZZARDS

• **STOP-OVER**
Herman Jones of Tampa, Fla., a wilted bouquet in his hand, waited patiently at LaGuardia Airport. His Italian wife, Rose, was a passenger on a long-overdue airliner. Finally, the plane showed up—without Rose. Explanation: she had paused at Gander, Newfoundland, to give birth to a boy.

• **NAVY VS. BUZZARDS**
At the Patuxent Naval Air Station in Maryland, the Navy provides guns for personnel who want to hunt buzzards. This unique pastime was

started after one of the buzzards smacked into a Navy plane, broke the vertical stabilizer, caused the pilot to bail out.

England's House of Commons was informed that 5,892,000 cigars have been flown into Germany to help quiet the nerves of besieged Berliners.

• **THE BURNING QUESTION**
In the film, "Fighter Squadron," the last scene shows star Edmond O'Brien spinning toward the earth in a shattered plane. Now Warner Brothers fan mail department wishes the film had ended on a happier note. Reason: 3,269 letters wanting to know whether O'Brien crashed to his death or managed to escape.

• **HIGH-SPIRITED FELLOW**
A Forked River, N.J., pilot appealed a CAB ruling which grounded him six months for flying while drunk. The Board reconsidered, had a change of heart, and grounded the pilot for three years.

• **THE ALIAS OF RUFUS JONES**
A job-seeker at the Chance Vought Aircraft plant was asked to fill out an application form. After writing his name, "Jones, Rufus," as requested, he came to the line, "Alias, or otherwise known as." Jones hesitated only a moment, then dutifully wrote: "Shot, Hot."

• **WITH NEATNESS AND DISPATCH**
Alaskan pilot Donald Dorothy knew what to do when his passenger went berserk and tried to strangle him. A quick barrel roll threw the man down, then Dorothy quietly knocked him out with a fire extinguisher.

According to Collier's Magazine of 1911, the world's military aviation strength was listed as follows:

France	38
Germany	24
Italy	8
Russia	6
England	3
United States	1

• **GONE TO POT**
Ernest Heinkel, famous German plane builder, now is manufacturing pots and pans in his Wuerttemberg factories.

The Navy's giant *Constellation* is large enough to carry three railroad cars *plus* a standard passenger bus.

• **THE FALL GUY**
When asked about his plaster cast, 11-year-old Richard L. Sawyer of Atlanta, Ga., replies nonchalantly, "Oh, I fell out of a plane." Richard is reluctant to explain that the plane was on the ground.

• **HEADLINE OF THE MONTH**
From the New York Herald-Tribune: PLANETARIUM OPENING CURSE ON CELESTIAL NAVIGATION.

• **JUST A SHORT ONE**
Alan Youell landed his helicopter in front of a busy pub in suburban London, drank beer for half an hour, paid his bill and took off.

Scotland Yard corralled him, couldn't arrest him. There was no law against it.

—Harold Helfer

beyond, stretched the San Joaquin Valley. Between the peaks and clouds on the southern horizon I caught a glimpse of a familiar landmark, Mt. San Antonio, known in southern California as "Old Baldy." I have always had a special affection for this mountain, having climbed it many times during my boyhood, but particularly in later years when its nickname and I had something in common. I knew it was over 160 miles away. Turning my one-eyed attention back to the peak on the northwest, I was able to identify it as Mt. Whitney, the mightiest (14,496 feet) in the U.S. At this point I estimated I had drifted about 20 miles south even though I was actually pointed west with an indicated 60 m.p.h. airspeed. The wind, which was west up to 20,000, had gradually swung to northwest with increased velocity. Increasing my speed to 110 m.p.h., I dove northwest to re-enter the wave. While changing speed, I noticed the elevators reacted stiffly. Icing? It didn't seem probable in clear air. It probably was shrinkage in the control cables, since it was about −30° at this altitude.

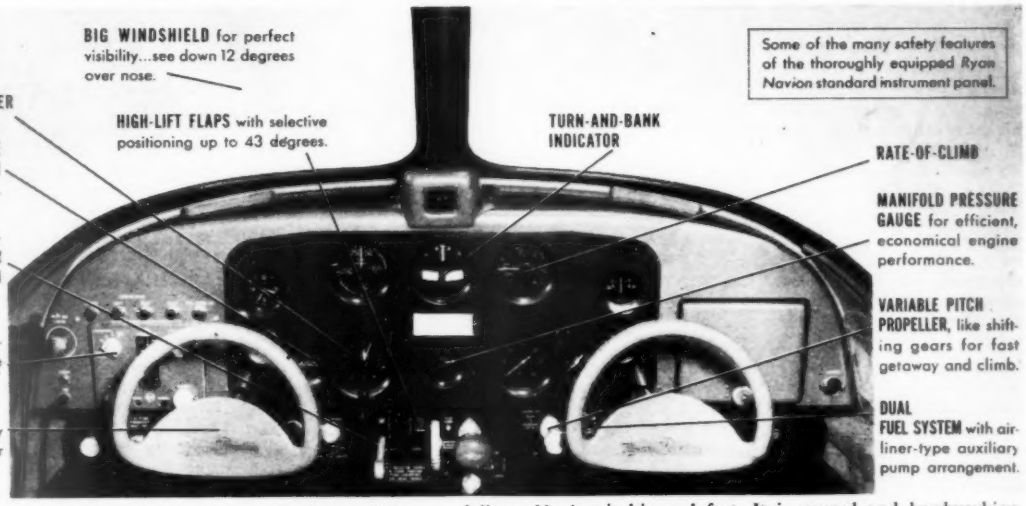
Slowing down north of Mt. Whitney with 24,000 feet, I encountered lift and began climbing once more, still in smooth air. Once again, as the lift continued, I was forced to back up while facing into the unrelenting wind. The rate of climb continued though it dropped from 300 to only 100 f.p.m. Finally, the altimeter read 33,300 feet! If the take-off setting—4,000 feet—had been accurate, this would have read over 33,400. Bishop Airport is actually 4,121 feet above sea level. Later calibration of the barograph showed I was at 33,500 feet above sea level.

By this time it was 4:20, I was thirsty and my feet were cold. Not having discovered the trick of drinking through an oxygen mask, I stayed thirsty. I fumbled around in the bilge for a chemical heating pad with supposed lasting powers of four hours. Triumphantly I drew it forth, but the victory was short-lived, for it was covered with frost. Though the temperature was still 10° in the cockpit, it was about 40° below outside. The sun was low. Where to go now? The record-breaking altitude made it imperative that I land where there would be witnesses.

While all this was happening, the valley below had been rapidly filling with clouds. Through an opening, I was startled to recognize Owens Lake. This meant that for the second time I had backed up about 15 miles while gaining altitude in the wave, even though I was actually flying into the wind with 50 m.p.h. airspeed indicated. Altitude correction changes this to 75 m.p.h. A few brief glimpses through the frost revealed only clouds over the area of Lone Pine, Independence and Bishop. The strong wind made the possibility of my returning to the take-off point rather remote. The combination of low clouds and high mountains lent even less charm to the idea. I had little appetite for flying into a cloud stuffed with granite.

I wondered how far I could go in the opposite direction, downwind. Certainly 150 miles. Perhaps to Los Angeles. Then I could spend the night at home in Ar-

IN A CLASS BY ITSELF FOR SAFETY, for easy flying, comfort, ruggedness, too!

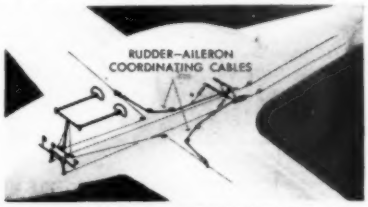

BIG WINDSHIELD for perfect visibility...see down 12 degrees over nose.
SENSITIVE ALTIMETER
HIGH-LIFT FLAPS with selective positioning up to 43 degrees.
TURN-AND-BANK INDICATOR
RATE-OF-CLIMB
DAMPENED FUEL GAUGE for accurate fuel quantity readings.
MANIFOLD PRESSURE GAUGE for efficient, economical engine performance.
TRICYCLE RETRACTABLE LANDING GEAR ...warning horn and position lights.
VARIABLE PITCH PROPELLER, like shifting gears for fast getaway and climb.
VHF RADIO for clear, reliable, long-distance communication.
DUAL FUEL SYSTEM with airliner-type auxiliary pump arrangement.
"TWO CONTROL"... fly with wheel only, after take-off.

Some of the many safety features of the thoroughly equipped *Ryan Navion* standard instrument panel.

BEHIND THE WHEEL of the *Ryan Navion* is the only place to learn how safe it is, how easy to fly. There's a reason why *Navion* gives you *more* of these vital qualities. Good aircraft design is a blending of desirable features. In the design stage, the dominant features of the plane to be produced are selected . . . all other features follow. *Navion* is big and fast. It is rugged and hardworking. But . . . first and foremost, it is *safe and easy-to-fly*. That's the way it was designed . . . the way it's built. That's why it's first choice with more and more businessmen who fly everywhere. And here's what makes it that way . . .

BIG, FULL-DEFLECTION, high lift flaps deliver landings at only 54 m.p.h. with full load and no wind. Only 875 ft. needed to clear a 50-ft. obstacle—landing or take-off.

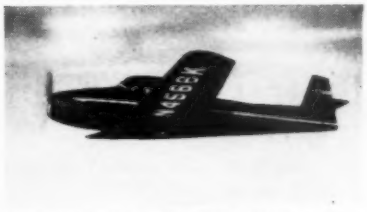
RUGGED, WIDE TREAD tricycle gear features oversize tires and steerable nosewheel. Deep-stroke shocks and equalized hydraulic brakes make ground-handling easy.



INTERCONNECTED RUDDER AND AILERON give you "two-control after take-off," yet you have rudder when you want it. *Navion* forgives pilot errors short of foolhardiness.

900-FT. PER MINUTE initial rate of climb is delivered by *Navion's* husky 205 h.p. engine. Dependable *dual fuel system*, like modern airliner's, is standard equipment.

FULL AILERON control *under* stalling speeds, with *Ryan Navion!* Rugged, stall-resistant, all-metal wings are "built like a bridge" . . . and that means real safety for *you!*



SMOOTH, "IN A GROOVE" flying even in rough air . . . cruising speeds up to 155 m.p.h. *Navion* delivers 800-mile economy range with auxiliary underseat fuel tank installed.

NO OTHER PLANE COMBINES SO MANY FEATURES SO WELL

Ryan Navion

THESE COMFORT FEATURES ARE STANDARD EQUIPMENT

- "All-Round" Sound Insulation and Muffler
- Soft-Cushioned 43-in. Rear Seat
- Front Seats Adjust Individually
- New Heating-Ventilating System
- Limousine-Type Center Arm Rest in Rear Seat
- In-Flight Access to Luggage
- Easy-Entrance Roll-Back Canopy

Rely on Ryan RYAN AERONAUTICAL COMPANY, 106 LINDBERGH FIELD, SAN DIEGO 12, CALIFORNIA

cadia. Second thought ruled this out. With the storm conditions indicated by the cloud formations, Los Angeles would be cloud-covered too. Furthermore, it would become dark shortly after 5 p.m. There was no time to go 200 miles. I turned south toward the familiar Mojave Desert, with its many airfields and less likelihood of continued cloudiness. A safe landing can be made on any of the numerous dry lakes which dot the area, though a long hike might result from choosing the wrong one. Just then a downdraft stole 3,000 feet of my hoarded altitude. But why worry? With 30,000 left I could afford to be generous.

The air was smooth, the oxygen gauge showed pressure remaining, and I had only navigation to think about. I concentrated on the section charts and strained to see landmarks that might help. The pale sun shining through the frost aided my compass in keeping me headed south, or a little west of south to allow for wind drift. I caught a glimpse of a lenticular cloud separate from the stratus mass ahead, so changed course farther west in order to pass on the upwind side of it. A little lift resulted when I reached its vicinity about 4:40 p.m. but it was too late in the day to stop and play.

Whizzing on, gliding downward, I strove to see something other than the cloud deck through that cold stuff which covered 95 per cent of my horizon. An occasional small opening revealed a discouraging view of barren desert.

In an area where even gas stations can be 50 miles apart, one doesn't land on barren desert. It seemed that I would have to be below 10,000 feet in order to see anything helpful. At 5 p.m., I was down to 20,000. It was growing dark. Suddenly a hole in the clouds revealed black runways on a dry lake bed. The remainder of the surrounding terrain was completely cloud hidden, making it impossible to identify the airport. It was just dark enough that I didn't care whose airport it was, or where it was. I just wanted to be on it.

How to get down? In a streamlined, efficient sailplane, at 20,000 feet, this alone is a problem. At 60 m.p.h. the plane sinks only 150 or 200 f.p.m. Diving at 100 m.p.h., fast for this type of aircraft, creates a sink of only 600 f.p.m. Diving through rough air at this speed is hazardous; further, it would require a half-hour, possibly longer, to descend. A dwindling oxygen supply complicated matters.

Fortunately, there is one safe, sure means of descent in some sailplanes—the tailspin. Dangerous? Not at all, if there is ample altitude. Some planes won't stay in a spin since the CAA prefers them that way. I think I'd still be up there, spiritually or otherwise, if the *Zanonia* were afflicted with spin-resistant qualities.

She does a beautiful spin, with recovery in 200 feet. So down we came, from 20,000 feet, doing five turns per 1,000 feet of descent. Rate of descent was 2,000 f.p.m., with a completely stalled airspeed of about 30 m.p.h. The spin can be stopped in half a turn, and normal flight resumed immediately. Doing a spin recovery at 10,000 feet, close to the clouds, I headed west, upwind toward the airport, for in this strong wind I had drifted over five miles while doing my 50-turn spin. I removed my oxygen mask. Might as well, the tank was empty. Another attempt to identify the airport was unsuccessful. It was growing too dark to see any landmarks.

The altimeter read 9,500 as I dove against the wind getting back to the airport. The next time I looked at it the reading was 10,500. The rate-of-climb showed 1,000 f.p.m. UP! I peeped out of my frost house at the clouds and recognized the familiar lenticular form on an adjacent cloud. The durn things were chasing me! After a 10-minute battle with the wild wind to regain position over the field, I was relieved and greatly reassured to find that lights were on. The cold thought of landing on a deserted ex-military base was happily banished.

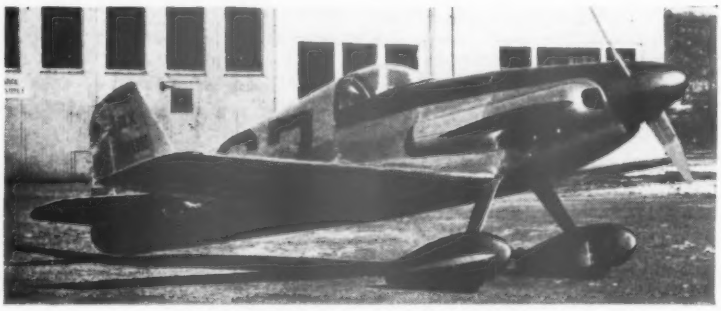
With 11,000 feet instead of 10,000, I resumed spin. It took eight turns to lose 1,000 feet because of the updraft. Yes, I was counting them. Finally, below 9,000, the normal rate of spin descent resumed. At 6,000 I looked around briefly, then resumed spinning to 2,800. Lighted runways and hangars were easily visible. While wiping clear a spot in the melting frost, I decided not to land on the windy runway, so made a controlled landing run into the gusty 40 m.p.h. wind, stopping 50 feet from the hangar doors. The altimeter read about 2,100 feet, at 5:22 p.m.

As I was unbuckling and preparing to climb out, a sergeant in a jeep drove up and, after a short conference, we rolled my ship into the hangar. The sleek *Zanonia* looked right at home beside her temporary jet and supersonic roommates. The Officer of the Day met me in Operations, and after hearing my explanation, escorted me to an Officers Mess where I was permitted to telephone Bishop.

At this point, almost an hour after landing, I still knew only that I was on a military installation. Finally I asked which one. The answer, "Muroc Air Force Base," amazed me. I didn't know I was that far south. There are several military fields in this area, some of them not even on the maps. Later review of the flight statistics revealed that the 110 miles between Owens Lake and the point over Muroc was covered in 40 minutes, an average of 165 m.p.h. ground speed with an 85 m.p.h. cross tailwind.

The landing at Muroc was rather embarrassing both ways since: (1) They don't let civilians land there. I'm a civilian. (2) Planes desiring to land must get radio clearance. My radio wasn't working, so it wasn't in the plane. (3) Naturally they don't like planes that sneak in quietly. And there I was, without a motor.

However, the Muroc personnel courteously heard my story and made available good food and a bed after I had placed a call to Bishop. When the call went through, three telephones on the Bishop airport were answered simultaneously. Everyone had been waiting anxiously except John Olley, my crew chief, who, undoubtedly, was just relaxing. When I mentioned my highest altitudes of over 24,000 feet gained above low point, and 33,400 feet above sea level, everyone whooped with joy—for these were both new American altitude records in gliding, pending homologation by the Soaring Society of America, and final approval of the NAA. END



MIDGET MUSTANG

THE *Midget Mustang* is the first Goodyear racer to be put into production. Designed by Piper-Stinson engineer Dave Long (who built the prototype as a spare-time hobby), the fast, all-metal single-seater will sell for $4,995, FAF.

To date, the plane has only an experimental license.

With an 85-h.p. Continental engine the *Midget* cruises at 170 m.p.h. and has a top speed of 200 m.p.h.

The production model (five are now being built by Schweizer Aircraft Corp., Elmira, N. Y.) will carry a safety belt and shoulder harness as standard equipment.

Here are the *Midget's* specifications:

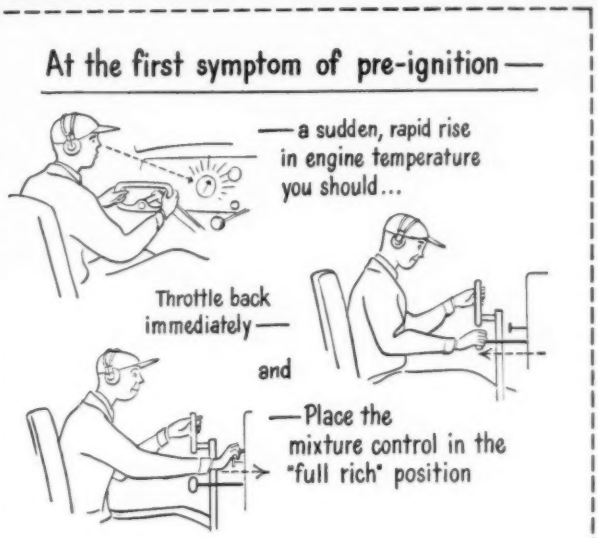
Wing span	18 ft. 6 in.
Length	16 feet
Height	4 ft. 6 in.
Gross weight	850 pounds
Empty weight	525 pounds
Wing loading	12.3 lbs./sq. ft.
Fuel capacity	15 gallons
Fuel consumption (rich)	6.2 gal./hr.
(lean)	5.5 gal./hr.
Baggage	35 pounds
Take-off run	365 feet
Top speed	200 m.p.h.
Cruising speed	170 m.p.h.
Landing speed (with flaps)	53 m.p.h.
Range fully loaded	410 miles
Service ceiling	22,500 feet
Rate of climb	1,585 f.p.m.

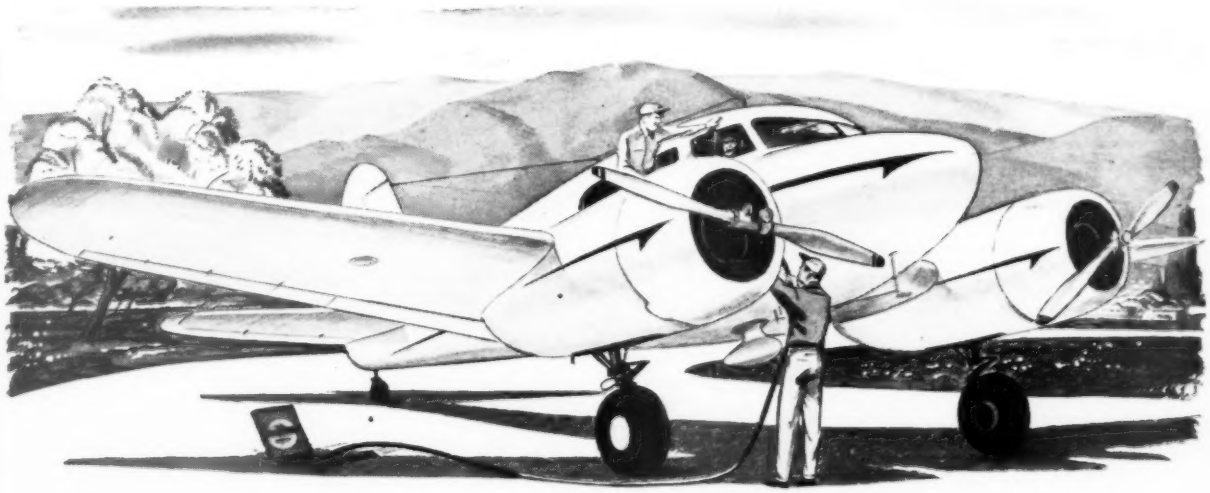
A page of service tips for private flyers and fixed-base operators

PLANE FAX

How to reduce pre-ignition

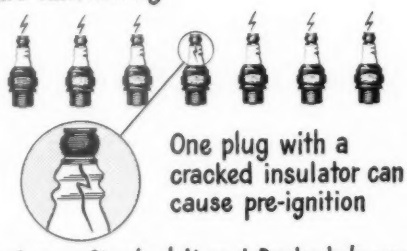
Low grade fuels encourage pre-ignition—and that often causes damaged pistons and engine failure. That's why it's so important to use only high octane Chevron Aviation Gasoline. This premium-quality fuel is scientifically blended for even combustion and peak performance under all flight conditions. That means fast starts, easy warm-up, extra power and dependable performance at every altitude.


At the first symptom of pre-ignition—
—a sudden, rapid rise in engine temperature you should...
Throttle back immediately—
and
—Place the mixture control in the "full rich" position



"Checked out" your spark plugs lately?

Be sure all spark plugs are functioning



Let your Standard Airport Dealer help you select the right plug for your powerplant

"We take better care of your plane"

Good spark plugs fight pre-ignition

Proof of a good spark plug is in its ability to operate at high engine output. Atlas Champion Aircraft Spark Plugs resist overheating which can result in pre-ignition and detonation. That's because they have a special insulating material, the finest known to ceramic science. Your Standard Airport Dealer can tell you the full story of Atlas Champions.

CHEVRON AVIATION GASOLINE

RPM AVIATION OIL

Standard Oil Company of California

Coast to Coast

(*Continued from page 25*)

and he became so obsessed with a premonition we would crash that he decided to travel by train. When we changed crews at Kansas City the young man's departure wasn't reported and the new crew spent nearly an hour hunting for him.

Riding through the tail-end of the night over Oklahoma I would have become drowsy except for the constant activity in the passengers' compartment. Now the stewardess came with a ballot; we were to vote for or against a 45-minute stop for a meal in Albuquerque. After listening respectfully to the campaign oratory of some of our hardier companions who urged that we fly direct to Los Angeles, the hungry segment won the election and the mandate was sent on to the pilot.

I was seated beside a sailor whose family lived in Long Beach, Calif., and he began worrying as we neared the end of the trip. He asked if I was sure we were going to land at Burbank, as he had been told, and not at the Los Angeles Municipal Airport at Inglewood. I said I had been assured both by the ticket agency and our stewardess that we would be put down at Burbank.

"That's fine," he said. "I've been uneasy since I sent a telegram in Albuquerque telling my folks to come to the Burbank Airport."

Soon we were over Burbank and approaching the airport. The sailor had his face pressed to the window, hoping to catch a glimpse of his family, particularly two little daughters he had told me about.

We circled the airport twice and then, just as we seemed to be leveling off for a landing, the plane climbed, soared over the Hollywood hills and headed toward downtown Los Angeles. The sailor looked at me as if I had betrayed him.

"Guess we have to kill time until we get an okay from the control tower," I said, trying to appear nonchalant.

We flew on, passing over the city, its southern suburbs and finally some oil wells.

"Holy cow, they're taking us to Long Beach," the sailor exclaimed.

He was right. We landed at Long Beach Airport because, as the stewardess explained later, "we were informed over Burbank that it will be a few days before we can use that field again."

"Well," said the Long Beach sailor, "now I can walk home and welcome my family when they get back from *their* trip."

The instant I stepped outside on Southern California soil I began bombarding my friends with oral advertising for the non-skeds. I had come from the East Coast in 16 hours for $99! I didn't mention the 12-hour promise in the newspaper ads. Maybe I would have had I known then that it was going to take 24 hours to get back to Washington.

For the return trip I drew Airline Transport Carriers, Inc., another of the five companies associated with the ticket agency I had patronized. Their plane was as well furnished as most DC-3s on scheduled airlines and the stewardesses did wear uniforms. But I got more than that for my $99.

This time I not only flew coast-to-coast but border-to-border as well. Here's how we did it:

Soaring off the Pacific slope, we flew to Albuquerque. Then, leaving the direct route to Kansas City, we headed for the Mexican border to make a stop at Amarillo, Tex. An Oakland bartender seated beside me was a bit annoyed by this deviation. He was flying for the first time, the 99ers making possible a visit to his parents in Philadelphia during a limited vacation. He hadn't seen his folks for 12 years and he hoped there'd be as little delay as possible.

The bartender asked the stewardess about this non-scheduled detour.

"Oh, we're just going to pick up a co-pilot for the crew that takes over at Kansas City," she explained.

There was a delay in Amarillo. After almost an hour, the bartender went into another huddle with the stewardess. He brought me the information that the spare co-pilot hadn't been informed he was to work that day and was now being routed out of bed in his Amarillo home. He arrived at the airport in a taxi a few minutes later.

But then the right engine wouldn't turn over. The regular co-pilot tugged at the propeller in the best pioneer-days style but it didn't help. At the edge of the field were a half dozen men whose high-heeled boots and other apparel indicated they might be cowboys. They sauntered over to see what was the trouble, one of them bringing a rope somebody had thoughtfully left coiled on a fence post. The co-pilot explained our predicament.

After they fashioned a noose and tossed it over a propeller blade, the six cowboys and the co-pilot took positions at the other end of the rope, a la Volga boatmen, and then threw their brawn against the inert blade. It turned slowly—until it pointed directly at them. Then, naturally, the noose slipped off the beveled end and the men went sprawling, boots over sombreros, on the concrete runway.

Bruised but undaunted, the cowboys got an automobile. Now they carefully laced one end of the rope around the three propeller blades at a point near the shaft. The other end of the rope was hitched to the car. As the latter pulled away, the rope unlaced on the propeller, turning it over. The engine started.

The wait hadn't been too irksome. A pretty stenographer from Brooklyn, who was returning from a vacation in Hollywood, opened a box of candy and shared it with the rest of us.

At Kansas City my bartender friend sent a telegram to his parents, revising upward the estimate of the arrival time he had put in a message wired from Albuquerque. He and I both assumed we would now fly direct to Dayton.

Instead, we went to Chicago to accommodate a San Francisco couple and their two children who were headed for a Midwest vacation. Then we skirted the Canadian border, flying over portions of Lake Michigan and Lake Erie, to Cleveland, where another man got off. The stop gave the bartender an opportunity to wire another estimate on his arrival.

Dusk was fading into night when we took off from Cleveland and the stewardess told the bartender and me that it was too late to go to Washington or Philadelphia and that we would fly direct to Newark.

"Anyway," sighed the bartender to me, "I just mentioned hours in those telegrams, I didn't tie myself down to any particular day."

Ten minutes after we landed in Newark I was aboard an Eastern Air Lines plane which took me to Washington. I arrived at the Capital at midnight—24 hours, almost to the minute, after leaving Southern California.

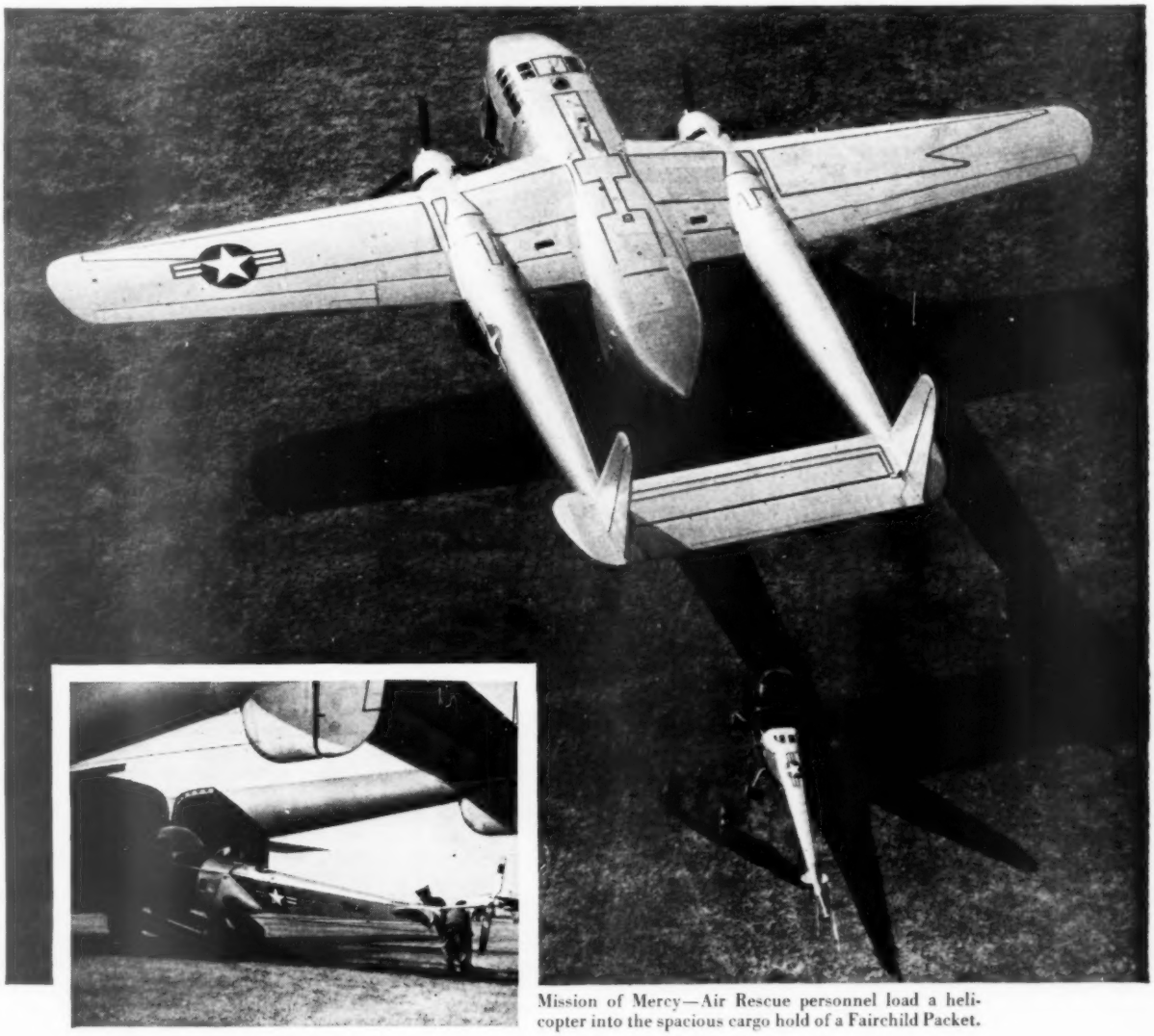
A vague uneasiness hung over me during this final phase of my journey. An Eastern flight attendant, who wanted to talk to the pilot after the take-off, had to unlock the door separating the main cabin from the cockpit. I recalled the relaxing informality of flying with the 99ers. This door was unlocked on their planes and, both going out and coming back, I had been invited to visit the cockpit, look at the instruments, chat with the pilot and peek out of the DC-3's nose.

The camaraderie of a flight with the non-skeds was missing too. There were only six other passengers aboard the Eastern DC-3 and nobody talked to anyone else. I remembered, too, that every seat was occupied when my flights with the 99ers began. I wondered whether I ought to write to Eddie Rickenbacker but decided he must know these things. END

"All I gotta say is, keep away from the Canadian Rockies!"

AIR RESCUE

Over faraway jungles, deserts and mountains, helicopters of the USAF Air Rescue Service have flown in search of stranded airmen and passengers. The helicopters got there because they have been given a "mother" ship—the Fairchild Packet—that transports them over distances far beyond their range. Thus, our Air Force has added a new ability to the versatile Fairchild Packet—increasing the importance of its part in the development of modern airborne military tactics.



Mission of Mercy—Air Rescue personnel load a helicopter into the spacious cargo hold of a Fairchild Packet.

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Washington, D. C.

(*Continued from page 40*)

hotel or motel rooms in advance when coming to Washington. In the spring and on to December it's mandatory that you write or, preferably, wire for reservations two weeks to a month prior to your arrival. You can get clean rooms accessible to downtown Washington for $2.50 or $3 at any of the small hotels or, if you prefer, you can lodge at the famed, more expensive Shoreham, Wardman Park, Statler, Mayflower or five or six other first class hotels. Motel rates run on an average of $4 a cabin per night.

Your stay in Washington will be mostly involved with "seeing." To start the venture off right, therefore, try to approach the city from the west. The view of the skyline will give you a thrill you can't duplicate anywhere else in the country. Preferably, if you're possessor of an airplane equipped for night flying, try to come in at dusk or early evening when the lights form a breath-taking artificial Aurora Borealis.

On landing, one of the first "things" you should see is your Congressman. No one comes to Washington without stopping in at the Capitol building to watch law in the making, and it'll pay you to visit your representative before going to the galleries. Your Congressman can get special passes for his constituents to the reserved sections of the galleries where a good view of the proceedings is handy. At the Capitol there is also a guided tour costing 25 cents. I advise you to skip it. It'll save you time and money to do so. All the statues and important rooms of the Capitol are marked. You can cruise through leisurely yourself and ask questions of the guards where explanations are not clear.

Though you'll do well to save a quarter at the Capitol, you'll also do well, unless you have friends to transport you in private automobile, to put out two bucks and get one of the guided tours which our White House friends offer. You'll see everything of importance in and around Washington, and you'll stop at the most important ones like Lee's Mansion and the Tomb of the Unknown Soldier in Arlington Cemetery, or Lincoln Memorial on the banks of the Potomac River. You can join these tours at the White House or at any of the main downtown hotels.

The White House itself is closed to visitors—even to President Truman himself—at present. It will be for another three years, which is the amount of time contractors anticipate it will take to repair the sagging White House structure.

However, being an aviator and liking heights, you can go to the top of the Washington Monument which is only four blocks from the center of the business district. Another tip—take the elevator; walking up will leave a tenderfoot aviator, whose posterior—not his feet—generally take the most beating, with aching muscles that require soaking and a long rest. The thrill doesn't come till you reach the top anyway.

Also, having flying in your blood, you shouldn't miss a trip to the shrine of all pilots—the Smithsonian Institute Building of Arts and Industries where hang the famous *Kitty Hawk*, first plane of the Wright Brothers, and numerous other well-known aircraft of past decades. If you are an AOPA member, the national staff of the private flyers' organization will welcome you with open arms at the headquarters in the Washington Building, two blocks from the White House.

One of the best trips you can take—all of which are reasonable in price—is the one on a riverboat down the Potomac to Mount Vernon, home of George and Martha Washington. The somber spiel of the colored attendant at Washington's grave will be worth the 90-cent round trip fare, to say nothing of the scenery enroute.

If you like, you can do a good bit of your sightseeing in the evening when the temperature drops. But most visitors like to sample the Washington night-life. There's plenty of it. From the swanky, expensive hotel dining-dancing rooms down to the bistros in the section around Griffith Stadium, home of the Washington Nationals, American League baseball team, you can't miss having a grand time.

By District of Columbia law, bars close at 1 a.m. on weekdays, at midnight on Saturdays. And, for the unindoctrinated, let us say that the law also forbids standing at a bar; to be served, you must be seated. In Virginia, just across the Potomac, there are no mixed drinks sold—only mixers. You bring your own or drink beer. In Maryland, you're allowed to cruise at will through the saloons.

Something to consider will be eating costs. You can get by in Washington on $2 to $10 a day, as your diet and your budget dictate. The one *must* spot on the list is the restaurant in the Capitol building where bean soup like mother used to try to make and a sight of political dignitaries closehand can be had at reasonable prices, 75 cents to $1 a throw. At other Washington "beaneries" you can get all kinds of food—seafood, Greek, French, Italian and Swedish cuisine, or good solid beefsteaks.

As well as budgeting your bankroll, figure on allotting time in advance of your trip. If possible, give at least one day to your sightseeing tour and half-days to the trip to Mount Vernon, the Smithsonian Institute (which houses more, by the way, than just airplanes), and the Capitol.

Count on making an excursion, a slow one if possible, through the Mellon Art Gallery where, on Sundays, you can pick up a free concert in the beautiful veranda in the center of the building. Some pilots and their families will probably want to hit Constitution Hall or, when it is used, the Watergate Theater at the foot of the Lincoln Memorial for recitals of music or dancing. Tariff is $1.20 to $3.60, depending on your seats. Since the National Theater became a movie house last year there have been no legitimate stage productions in Washington. Only movies, accompanied at one theater by a stage show, are available for the drama-minded. If you're the athletic type, sailing boats, tennis courts, golf courses and swimming pools are in abundance. Nearby beaches in Maryland and Virginia offer relief from mid-summer heat.

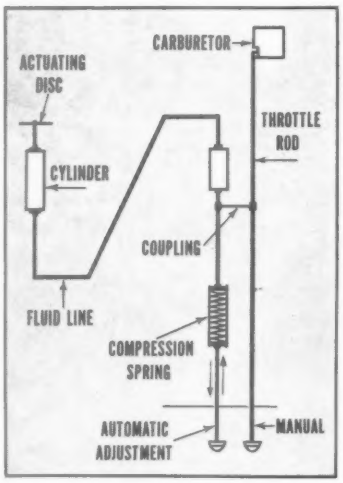
You don't have to spend much money to enjoy yourself in the nation's capital. But, if you exceed your budget, try consoling yourself by visiting the Treasury Department's Bureau of Engraving where most of that fine green stuff which passes so quickly through your hands is turned out. Sorry—no samples.

The fees for your airplane won't be much. Tie-down costs at local airports are nominal—50 cents to $1 a night. Some hangar space can be obtained at a few airports for $1.50 a night. Gas and what little repair costs you may have will be no more than in any other area.

If you're anticipating no need for repairs, your best bet is to fly into Washington National Airport, one of the finest

"THROTOMATIC"

A THROTTLE control device that automatically adjusts a lightplane's power setting for take-off, cruising and climbing has been developed by two Mississippi inventors. The designers claim the device (called "Throtomatic") enables pilots to set the throttle for specific airspeeds, then fly "hands-off throttle" from the first part of the take-off run until the plane is ready to land.

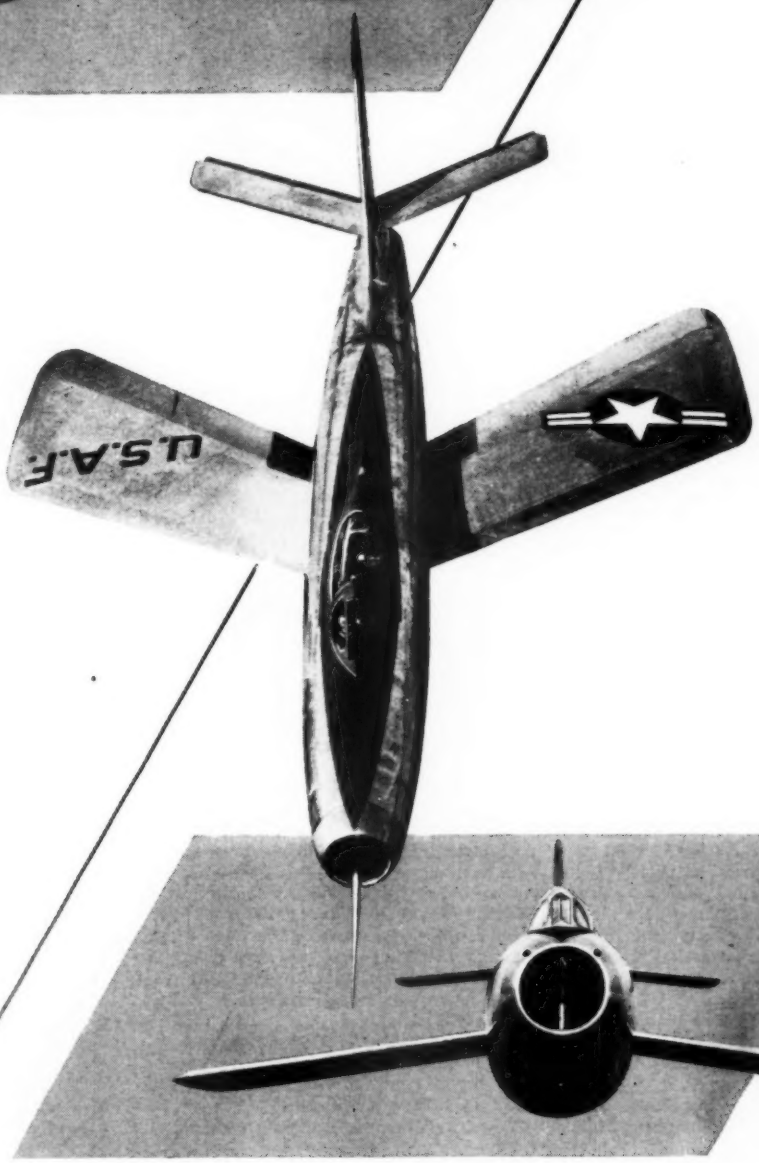


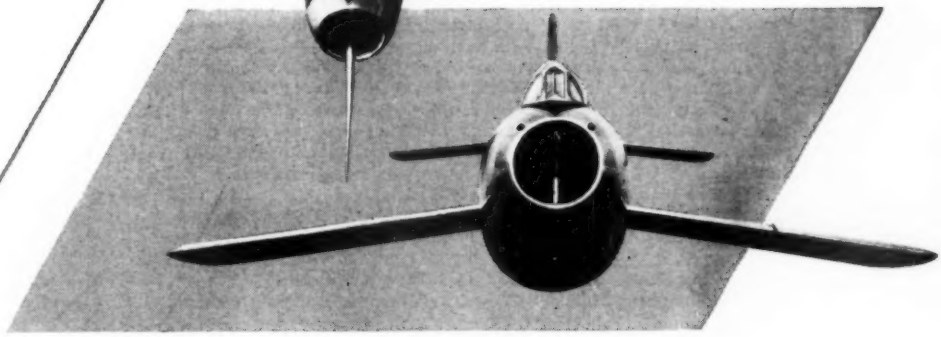
Basically, the "Throtomatic" operates in the following manner: When airspeed is increased over the desired setting, an actuating disc on the leading edge of the wing (see diagram) is compressed, sending force along a flexible fluid line to retard the acceleration. When airspeed is decreased (such as in climbing) less resistance is placed on the actuating disc, allowing a compression spring to overcome the system and advance the throttle.

The manual throttle control is so designed that it can override the "Throtomatic" at the pilot's will.

Inventors of the device, for which patent is pending, are C. W. Stephens, Jr., and J. M. Faulkner, of Oxford, Miss.

THIS IS THE XF-91





REPUBLIC AVIATION

Farmingdale, Long Island, N.Y.

Makers of the Mighty Thunderbolt • *Thunderjet* • XR-12 • XF-91

SOME AIRPORTS SERVING WASHINGTON, D. C.

Airport	Phone No.	No. Runways	Longest Runway	Gas Grades Available	Service Facilities
Washington National	RE 6131	3	5,500	80, 91, 100	None
Beacon Field	AL 8549	2	3,000	80, 91	A & E
Hybla Valley Airport	TE 2333	2	4,500	80, 91	Major Repairs
Bailey's Crossroads	FA 9851	2	2,800	80, 91	Repairs
Springfield Airport	AL 8342	2	1,900	80	Minor Repairs
Queen's Chapel Airport	WA 9640	2	1,900	80	Minor Repairs
College Park Airport	UN 3225	2	2,200	80, 91	A & E
Erco Field	UN 1441	2	2,800	80	Major Repairs
Schrom Field	TO 6363	1	5,700	80, 91, 100	A & E
Congressional Airport	OL 8888	2	3,800	80	A & E
Hyde Field	SP 0888	2	4,800	80, 91	A & E

terminals in the U. S. Operated by the CAA, the field has a $1 tie-down fee for each night but, though you can get any octane gas you desire, there has been no fixed-base operator authorized on the field as yet. The three runways are concrete. Most parking areas are grass, the concrete areas having been leased by the airlines. Transportation is best from Washington National, closest to downtown Washington, which is served by limousine, taxi and 15-minute interval bus service.

South of Washington National, which is in Virginia, are two fields located close to Alexandria. For pilots wanting to stay in historical Alexandria rather than Washington proper (and it's not a bad idea) either Beacon Field or Hybla Valley airport are best. Located three and 4½ miles south of Alexandria, respectively, the fields are connected with the Virginia suburb and Washington proper by the same bus service. Beacon management charges 50 cents a night for tie-down and offers the services of its courtesy car, a station-wagon, gratis to transient pilots. Hybla Valley boasts one of the most complete aviation repair and maintenance services in the area. Tie-down costs there are $1 a night, decreasing each night you remain. You'll find 80 and 91 octane gas at both fields.

Another field in Virginia and the closest private airport to Washington is Benn's Field at Bailey's Crossroads, four miles due west of Washington National. The field is clear of obstructions, having two runways—the longest 2,800 feet. It has 80 and 91 octane fuel. Fee for tie-downs is $1.

A good, small Virginia field, but one seldom used by transients because of the difficulty of getting into Washington is at Springfield, a little town about 10 miles southwest of Alexandria. There is a bus service but it's irregular. Largest plane the field can handle is a Stinson *Reliant*. Only 80 octane gas available.

There are no fields in D. C. proper, but Maryland sprouts them like corn stalks. Closest to the District is Queen's Chapel. But three other equally good airports are within gliding distance: College Park, Erco, and Schrom. These four all are northeast of the District. Queen's Chapel, only one of the near-D.C. airfields that cannot provide night lights on request, charges 50 cents a night for tie-downs. No hangar space available. The field has two runways, the longest 1,900 feet.

College Park and Erco fields, which almost overlap, are both connected to downtown Washington by bus or streetcar. Both have two runways, the longest at College Park 2,200 feet, the longest at Erco 2,800. Only 80 octane is available at Erco, but you can get 80 and 91 at College Park. Fees for tie-down are $1 at both fields. Erco adjoins the Engineering and Research Corp., makers of the *Ercoupe*.

Schrom Field, just beyond Erco, can handle anything up to and including a DC-3 on its one hard-surfaced runway, more than a mile long. Tariff is 75 cents a night. If you need 80, 91 or 100 octane, you can get it there.

Two other Maryland airports, Hyde Field, near Andrews Air Force Base at Clinton, Md., and Congressional Airport, northwest of D. C. beyond the National Naval Medical Center at Bethesda, are under the operation of one man. Some hangar space is available at Congressional for $1.50 a night. Tie-down at both of the two-runway fields is $1. Transportation into Washington can be obtained in buses or service cars.

Most of the fields, excluding Washington National, are equipped to handle any repairs your aircraft might demand. Radio facilities for the area are excellent, with a range station located just south of Washington National, which also has GCA equipment available for emergency use.

It's possible that the White House hucksters won't starve for lack of business if you don't show, but they—and you—will be better off for a holiday in the nation's capital. Sooner or later you'll be going—why not plan to fly there on your next vacation? END

Weekend Grasshoppers

(*Continued from page* 31)

Howard Schonfler, my instructor, I put in an hour's flight time on basic maneuvers, landings, or short local hops. If the weather's bad, I make up the time on the following weekend, usually taking a longer (two or three hour) flight to Rochester or Buffalo.

Although liaison pilots have to indicate on their "request for flight orders" the exact day and length of time they will fly, there is a clause giving a 15-day leeway. That enables the training to be adjusted to demands of civilian life. Flights can't be shorter than 30 minutes.

The Army encourages pilots to work for instructor's ratings. That's a fairly certain sign that present reservists would be used to teach younger men the tricks of the liaison trade in times of national mobilization. Obviously, the knack of low-and-slow flying in battle isn't in the repertoire of the boys who buzz around the country in dart-like jet fighters or giant bombers. The liaison trade is specialized.

Liaison pilots rated during the war are eligible for re-rating in the Officers Reserve Corps (provided they can obtain a CAA ticket). After assignment to a reserve unit as a liaison pilot, and after passing the Air Force's Form 64 physical exam for flying personnel, the pilot can take flight training at any school in his military district.

Take, for example, the situation in New York State. Sixty-five schools are certified for training. Pilots receive flight orders each three months entitling them to 25 hours of dual or solo flying (with $8.50 maximum payment for solo, $10 for dual).

After logging time, pilots sign a voucher, receive a certificate attesting to monthly flight time—and that's all there is to it.

The Army won't let reservists fly any kind of plane—but all flight schools can fill the bill on aircraft. Regulations state the plane must be conventional three-control, high-wing, two-place land monoplanes with engines developing 65 to 90 h.p.

Ex-grasshopper pilots who own planes can fly them for 25 hours per quarter—and bill the Government at the regular rate set by certified schools. Privately-owned planes, of course, must meet CAA licensing and maintenance requirements.

Unlike the Air Force's semi-high-powered program, these Army Field Force pilots operate almost as lone wolves. They drive or hitch-hike out to airports on Saturday or Sunday. They don't band together in organizational groups because at most only two or three fly at the same school. In New York State, only 38 pilots are now enrolled in the training. With New York's 65 accredited schools, chances of meeting a wartime flying buddy are slim.

But the Grasshoppers seem to like it that way. It's the way they fought the war—almost always in small groups, or alone. END

MAJOR ROBERT CRAWFORD

the man who put

"THE WILD BLUE YONDER"

into the sky

SAYS:—

"AOPA-- YOU ARE NEEDED MORE NOW THAN EVER BEFORE!"

"When I first took my little airplane from New York to Los Angeles and Seattle in 1932, conditions for the private flier were pretty rough; it was even tougher for the private airport operators. Private flying was truly embryonic. When I returned from that trip I resolved to fight for private aviation . . . a fight I have never given up. Then . . . I found AOPA and joined because you were, and are, fighting for the things the private pilot and operator must have to make flying enjoyable and available to all 'who love the vastness of the sky.'

"Today, with CAA as full of red tape as ever, putting every possible obstacle in the way of private aviation development, you are needed as never before! Keep up the good fight. As president of the Greater Miami Aviation Association, I extend to you my congratulations and good wishes."

(Signed)
BOB CRAWFORD
AOPA Member Pilot 6270

Your AOPA Membership is waiting. Dues only $5.00 a year. Join the biggest, finest, private flying organization in the world - - TODAY! Use this coupon now.

Valuable AOPA Services FREE to Members

The Washington staff of AOPA will help you in personal flying problems, licenses, regulations, legal tangles, plane sales and purchases, documents, aircraft financing, employment. Also national AOPA-Hertz Drive-Ur-Self courtesy card; AOPA Washington Newsletter; each month the special AOPA edition of FLYING magazine; TWA-AOPA courtesy card assuring service and maintenance facilities at most TWA airports, advantageous aviation insurance service; distinctive AOPA pilot's wings, emblems for your plane and car, and membership card. Above all else, AOPA continuously protects and fights for your flying interests in government and other circles.

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I first soloed an airplane at.....in the year.....

I own aircraft NC.....Make.....

I hereby apply for membership in AOPA.
Enclosed find check or money order for.....
(U. S. A., Canada, Mexico, Central & South America, $5.00; All other Foreign, $6.00.)

NAME.....
Please Print

ADDRESS.....

CITY & STATE.....

PILOT LICENSE NUMBER.....

SIGNATURE.....
$1.80 of each year's dues are for my subscription to the AOPA Edition of FLYING.

Swashbucklers

(*Continued from page 37*)

to earth was made while nearly unconscious from loss of blood. He went back to El Paso.

Wild Bill Heth decided to leave Pancho on short notice. He was arrested, sentenced to be shot, and escaped only by bribing a colonel and four captains. They let him leave the jail by the back way, and he headed northward 200 miles toward the border.

Then Rhineheart decided to follow Heth's example. One day when on a scouting patrol he flew his machine northward until the gas gave out, landed and walked the rest of the way.

After that, Villa bought a Martin biplane and assigned it to another cocky adventurer, Sailor Bill Lamkey, who did some useful flying before his enthusiasm waned and he was permitted to return to the States. Lamkey, by the way, was the only aviator in Villa's employ who actually collected all the money due him.

Few men of any generation have flown as well as Lincoln Beachey. He remains, after more than three decades, almost what his 24-sheet posters proclaimed him: "The Greatest of Them All."

In an old 80-h.p. Curtiss pusher, designed by rule of thumb and built like a birdcage, he did things that no other man has ever done. His forte was the ability to come close to things without hitting them.

To do loops and flip-flops high in the air required no unusual skill, but to fly between trees so close together that the machine had to be banked at 60° to pass through was flying of exceptional caliber.

Another of Beachey's favorites was to fly around a half-mile racetrack and flick up dust with his wingtip on the turns. This was a matter of half an inch. Another half-inch would have tripped the plane and caused a crash.

For two seasons Beachey teamed up with auto racer Barney Oldfield in a racing stunt that kept crowds in a frenzy. While Barney roared around the track in his Fiat Special or his Christie, Beachey would fly no more than a foot above him all the way around the track.

On several occasions, Beachey rested the plane's front wheel on Barney's head while both plane and car were doing better than 60 m.p.h. Beachey's flight down Michigan Boulevard in Chicago, 18 inches above traffic, will probably never be duplicated—if the CAA retains anything to say about contemporary flight activities.

Like all great artists, Beachey had his off days. One time, just as he was clearing the fence at Ascot Park, Los Angeles, he noticed a group of thrifty citizens in a tree outside the grounds, beating the gate to the tune of $1 a throw.

Annoyed at this display of parsimony, Beachey headed directly toward the tree —missing it by a hair's breadth. Californians flopped from the branches like overripe pomegranates—and the press, arraigning Mr. Beachey for recklessness, reported three broken arms and a fractured skull.

Several years later, when Beachey decided to be the first American to loop-the-loop, he went to the Curtiss factory to take delivery of a special "looping machine." Testing it, he had the misfortune of brushing several spectators off a hangar roof with his right aileron. There were three fatalities.

Beachey usually received $1,000 a day for his exhibitions. After four or five years of steady flying, not counting the several years he had flown 10-h.p. dirigibles, he announced his retirement and went to France. There, a rotary 80 h.p. engine intrigued him. It was a beautiful thing of polished steel, as perfectly balanced as a brace of dueling pistols.

Beachey took the weight of the engine, added his own to it, and to the total put the weight of a monoplane he had dreamed up. Then he took the static pull of the engine in pounds, and found he had propeller thrust to spare. In short, he could climb almost straight up.

He bought the engine, cancelled his reservation for Monte Carlo and other European resorts, and journeyed back to the U.S. and San Francisco. He built a monoplane that weighed less than the pull of its own engine—a machine with a vertical climb. It wasn't a helicopter but it had helicopter characteristics.

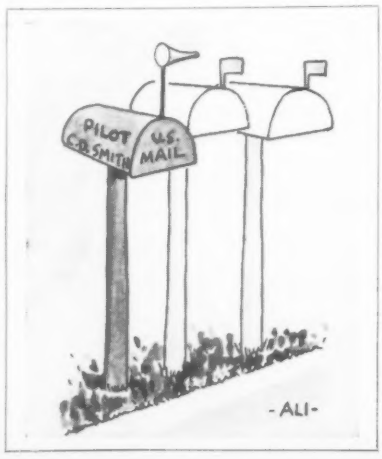
It was 1915. When San Francisco citizens heard about the experiment, they insisted the Panama-Pacific Exposition couldn't get along without him. Beachey set the tariff at $1,500 per day. Exposition officials jumped at the price.

Beachey flew his little machine for two days, testing its performance. These first flights were exploratory and comparatively cautious. But on the third day he decided to limber up.

He went to 2,000 feet, continued climbing and finally reached 3,000 feet above the city. The California sun shone brightly, and crowds below had to shade their eyes in order to keep the little plane in view. Beachey dived, did a couple of loops—and both wings came off!

The fuselage without wings was little more than an overgrown bullet. Beachey must have realized he was through. Yet he still took time on that hurtling, wingless dive to shut off his engine and close the gasoline petcock.

Then, because he saw he was headed for the water, he tried to unbuckle his safety belt. But the leather was new, the buckles stiff. Having broken two of his faultlessly manicured nails, he took out his pocket knife, opened the blade—and crashed.



Split seconds weren't enough for Beachey that time.

Three days later, San Francisco gave him the biggest funeral the city had seen since the boom days of 1853. The world had lost an amazing man.

After Beachey's death, the Fair people sent for Charley Niles, who believed he was as good as Beachey.

On Niles' first flight the engine failed on take-off and he plunged into the water. His head snapped forward and he banged his mouth against a heavy ash compression strut in the fuselage. His front teeth were embedded in the wood and broken off. So deeply were they sunk in the strut it took pliers to remove them.

But Niles was flying again in a few days, bandages, false teeth and all. He survived the exposition only to be killed some months later when a wing collapsed at the Wisconsin State Fair.

The list of these wild exhibitionists is long. They loved their freak occupation —and, like sword-swallowers and glass-eaters, they commanded a price for putting on a spectacle. As a rule, the flyers were booked for a three-day date. The field was usually too small to fly from, the engine invariably gave trouble, and the crowd thirsted for blood.

One time De Lloyd (Dutch) Thompson was scheduled to fly out of a quarter-mile race-track in rural Minnesota. The wind was gusty, the engine bad—and Thompson knew he'd never clear the trees, which incidentally weren't shown on the map sent him before he signed the contract.

The fair committee insisted he make the flight. Thompson insisted they cut down the trees. Negotiations had reached an impasse when the crowd surged toward him, calling him a coward and threatening to smash his machine.

Thompson thought fast. "Gentlemen," he drawled, "I'm perfectly willing to fly." He paused. The crowd perked up. "But in this wind, the plane needs ballast. If one of you will accompany me, I won't charge him a cent—though my usual fee for a ride like this is $50."

There were no takers. Thompson feigned surprise. "What? Nobody wants to ride with me? Come now, isn't there a sport in the crowd? How about you, sir—or you?" He had a piercing eye, and the crowd began to melt away. Then the flyer leaned against the strut, his honor vindicated. (One of the few pioneers to outlive those hectic days, Thompson died in January, 1949, at the age of 60.)

Another of the professional flyers was the "Boy Birdman," Art Smith, who looped-the-loop at night, his machine illuminated with fireworks, descending only in time to extinguish the blaze which usually started. After 12 years of stunting, Art—like most of the others—was killed in an exhibition crash.

These men flew when aviation was neither science nor industry—only adventure. Their feats will not be duplicated because the frontiers they explored no longer exist. END

Traffic Rules

(*Continued from page* 35)

presence. Because of this, the pilot of the passing aircraft must be alert for any changes in altitude or heading that the other pilot may make. The overtaking aircraft passes to the right because in side-by-side aircraft, the pilot normally will be on the left and in a better position to observe the aircraft he is passing on the right. Similarly, the pilot of the overtaking aircraft will be completely out of the path of oncoming traffic.

Traffic on the final approach, or landing, has right-of-way over other traffic in the air or on the ground. When approaching the airport to land, the aircraft at the lower altitude has right-of-way, but this rule should not be used to cut other planes out of traffic.

Regardless of the rules of Part 60, no pilot is relieved of his responsibility in making aviation safe for all.

60.105 Proximity of Aircraft

Formation flight, in its true form, is a potential collision course. Nevertheless, some feel that flight in close proximity to other aircraft is a necessary part of training, "although this fallacious concept obviously is based on delusive reasoning." If pilots feel they must practice formation flight, they should do so only after agreeing on such things as signals, distance, etc., before taking off. In this way the hazards can be reduced somewhat but not eliminated.

60.106 Acrobatic Flight

Before going aloft to perform acrobatics, the pilot must be sure that his maneuvers will not be executed over congested areas or open-air assemblies of persons. He must be equally certain that he will not perform within the bounds of *civil airways* or *control zones*. The visibility must be at least three miles and he must always begin acrobatic maneuvers at an altitude sufficient to assure recovery at least 1,500 feet above the surface.

The flyer must be sure that his plane is structurally safe for acrobatic flight and that he has sufficient training and experience to do that kind of flying. No rules can be written that will completely protect a pilot from himself. Every person who flies should be allowed the thrill of acrobatics; but no person should intentionally subject the lives and property of others to hazard while realizing this pleasure.

60.107 Minimum Safe Altitudes

Operation of any aircraft at a low altitude has long been recognized as a hazard. Chances of making a safe forced landing when close to the surface are slim because of a limited selection of available fields.

Pilots must maintain an altitude which, in event of a power failure, will insure safety to persons and property on the surface during the ensuing emergency landing.

When flying over congested areas, or assemblies of persons, an altitude of at least 1,000 feet above the highest obstacle within 2,000 feet in a horizontal plane from the aircraft should be maintained. The best method of satisfying this rule is to maintain sufficient altitude to glide well beyond the area in case of a forced landing and in every case to observe 1,000 feet as a minimum altitude over congested areas.

Over other than congested areas, a pilot is allowed to fly below 500 feet except when he is over a person, vehicle, structure, or vessel. Such a flight is possible, but the frequent changes in altitude to satisfy the rule would be very tiring indeed. An altitude of 500 feet over open country is low enough to give the sensation of speed and to satisfy any desire for low flight; at any lower altitude the pilot is definitely within the danger zone.

On instrument flights, the minimum altitudes are prescribed by the Administrator and published in the CAA Flight Information Manual. The flight altitude is assigned by traffic control. Where no IFR (instrument flight rule) minimums are prescribed, the pilot must maintain an altitude that will clear all obstacles within 1,000 feet in a horizontal radius of five miles from his intended course.

Altitude is the best and the cheapest insurance a pilot can have.

60.108 Operation on and in the Vicinity of an Airport

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otherwise instructed. This rule eliminates the great traffic hazard of having all aircraft circling in different directions. If the standard flow of traffic is not practical, the pilot will be informed of this either by the control tower or by airport markers visible from the air. Where the airport is equipped with a control tower, the pilot is required to make radio contact or watch the tower for light signals prior to landing. A pilot will do well to familiarize himself with the traffic pattern in effect at each airport he intends to land on.

60.109 Air Traffic Control Instructions

Control of air traffic has been established for the safe conduct of flight over designated routes and through certain areas. These routes and areas are commonly known as airways or control areas and control zones. Traffic control centers guide traffic from point to point along the designated airways in the most expedient manner possible within the limits of safety. Once the pilot has received and acknowledged instructions from the control center, he should adhere to these instructions unless, or until, they are changed by Air Traffic Control.

60.110 Notification of Arrival

Once a flight plan has been accepted by ATC and the clearance issued, the control center will follow the flight and maintain the separation necessary for safety. When the pilot arrives at his destination and files his notice of arrival, ATC will close the flight plan and clear other traffic along the route. If no arrival notice is given within a specified time interval, however, ATC will start a costly search procedure. A notification of arrival is the pilot's "thanks" for a favor received.

60.111 Adherence to Air Traffic Clearance

A flight plan is, in effect, an outline of a pilot's intended plan of operation and a request that ATC keep other traffic clear of his flight path. ATC may approve the flight plan without alteration or may make certain changes to conform with existing traffic, prior to issuing a clearance. After clearance has been acknowledged by the pilot, it is assumed that he will adhere to its provisions. On this assumption, ATC issues additional clearance along the same route, allowing for adequate separation. Chaos would result if pilots were allowed to deviate from their commitments without first requesting ATC permission. The use of emergency authority has already been discussed in the review of Section 60.01 (Authority of the Pilot).

60.112 Water Operation

The rules governing the operation of aircraft on water are very similar to those governing airborne aircraft. The rules of crossing the path of, approaching head-on, or overtaking are identical (see Section 60.104). The pilot who intends to operate aircraft on water will find it advisable to familiarize himself with marine regulations pertaining to the operation of vessels.

60.113 Aircraft Lights

In the air and on the ground, aircraft lights must be displayed between the hours of sunset and sunrise. Mean solar times of sunset and sunrise, as published in the Nautical Almanac and converted to local standard time, should be ascertained before flights are begun which involve the use of lights. Reliance should not be placed by the pilot solely upon visual observations.

60.2 VISUAL FLIGHT RULES (VFR)

The following explanations help to clear up the meaning of terms used in the regulations:

A *"control zone"* is the air space of defined dimensions, designated by the Administrator of Civil Aeronautics extending upward from the surface, to include one or more airports. Control zones generally lie either on or off a civil airway and are clearly marked with circles on aeronautical charts.

"Control areas" are the designated areas in which traffic control is exercised in the air space extending upward from an altitude of 700 feet above the surface. Control areas, or civil airways, are 10 miles wide and are clearly marked on aeronautical charts.

The term "elsewhere" covers all air space not designated as a control zone or a control area and includes the air space extending from the surface to 700 feet above the surface along the designated civil airways.

CHART OF VISIBILITY AND DISTANCE-FROM-CLOUD MINIMUMS

Flight conditions	In control zones[1]	In control areas	Elsewhere
At altitudes of more than 700 feet above the surface:			
Visibility ...	three miles[2]	three miles	one mile
Distance from clouds ...	500 feet vertically and 2,000 feet horizontally[2]	500 feet vertically and 2,000 feet horizontally	500 feet vertically and 2,000 feet horizontally
At 700 feet or less above the surface:			
Visibility ...	three miles[2]	.....	one mile
Distance from clouds ...	500 feet vertically and 2,000 feet horizontally[2]	Control areas do not extend below 700 feet above the surface. Therefore the "elsewhere" minimums apply	clear of clouds

[1] A minimum ceiling of 1,000 feet is required for VFR operation in a control zone unless authorization is received from air traffic control.

[2] If traffic conditions permit, air traffic control will issue air traffic clearance when the minimums are less than those specified, but under this provision the flight must remain clear of clouds.

60.200 Distance from Clouds

The chart on this page shows minimums for visual flight rules and distance from clouds. Note that a pilot may obtain authorization from Air Traffic Control for flight in a *control zone* when the vertical and horizontal distance from clouds and ceiling minimums cannot be met. In this case he must remain clear of clouds. When these minimums cannot be met during flight through a *control area*, the pilot must proceed under instrument flight rules.

60.201 Visibility

Refer again to the chart below. Part 60 of CAR separates visibility requirements into two individual categories, namely, "ground visibility" and "flight visibility." A pilot is permitted to enter a control zone flying visual flight rules (VFR) without a clearance when *ground visibility* is less than three miles, provided his *flight visibility* is three miles or more. Under these conditions, however, he must obtain a clearance to enter the traffic pattern, land, or take off in the zone. When *flight visibility* drops below three miles, flight within a control zone is not permitted unless an air traffic clearance is obtained from Air Traffic Control.

When flight visibility within a control area is below three miles, instrument flight rules must be observed. Flight outside of control zones and control areas (the areas officially designated as "elsewhere") must be conducted under instrument flight rules whenever the flight visibility falls below one mile.

60.202 Cruising Altitudes

Ordinarily, when an aircraft is operated under VFR (visual flight rule) conditions, there are no restrictions on the altitude selected for flight as long as safety is maintained. Certain modifying conditions, however, must be considered when selecting a cruising altitude.

If operating within *control zones* and *control areas* at an altitude of more than 3,000 feet above the surface, the odd or even 1,000-foot altitude appropriate to the direction of flight must be maintained. These altitudes are published in the CAA Flight Information Manual. When operating *elsewhere* at an altitude of more than 3,000 feet above the surface with the flight visibility at less than three miles, the altitude appropriate to the magnetic course must be maintained. You fly odd thousands on magnetic courses of 0° to to 89° inclusive; odd thousands plus 500 feet on headings of 90° to 179°; even thousands on headings of 180° to 269°, and even thousands plus 500 feet on headings of 270° to 359° inclusive.

60.203 VFR Flight Plan

Although it is not necessary to file a flight plan for visual flight rule (VFR) flight, the wise pilot will take advantage of this service at every opportunity. By so doing, he may have the benefit of any search and rescue facilities available in

case of emergency. Moreover, a flight plan is an essential part of the preflight action provided in Section 60.101 for cross-country flight, because it acts as a check on the pilot's understanding of existing conditions en route and of the limitations of his aircraft.

If a VFR flight plan is filed, the pilot should adhere to its provisions and always file notice of arrival immediately upon completion of the flight. Failure to file a notice of arrival is subject to rather severe penalties because search and rescue facilities may have been falsely alerted.

60.3 INSTRUMENT FLIGHT RULES (IFR)

When weather conditions make it practicable to conduct a flight in accordance with the visibility and distance from cloud rules discussed in the visual flight rules section (60.2), the pilot must then operate his aircraft in accordance with the instrument flight rules. All IFR flights require detailed flight plans and air traffic control clearance. Because comparatively few pilots are qualified for instrument flight, and these are highly skilled, FLYING's editors will not include the discussion on instrument flight rules. Pilots not qualified for IFR flights should stay out of instrument weather conditions under all circumstances whatever the delays and inconveniences caused. END

Jet Fighters

(*Continued from page 23*)

tually, however, the cloud cover usually found over Europe and the generally poor visibility threatened to curtail our activities severely. The development of radar saved our bacon and allowed targets to be found and hit both at night and under the most adverse weather conditions and at any altitude. Radar now makes *ultra* high altitude bombing possible.

The altitude barrier is that indefinite roof in the stratosphere beyond which oxygen breathing power plants cannot operate and where the air is so thin that the wings can no longer support the weight of the plane. The bombers can fly just below this level—forcing the fighter to surpass him in rate of climb, in speed, in maneuverability, and in general under conditions which are more favorable to the bomber's defense. This advantage will continue only as long as both fly at subsonic speeds. When fighters break through into the supersonic world they will regain their advantage in speed, altitude, and maneuverability.

It can also be shown that if extreme altitude is achieved, speed becomes less and less important, and maneuverability, or the lack of it, becomes the deciding factor in whether successful fighter interception can take place.

It's now an open secret that present-day fighters are all but helpless at these altitudes. Their maneuverability is limited to wide sweeping turns of several miles radius with resulting difficulty in picking up the bomber by radar-sighting and laying their fixed guns on him while at the same time avoiding his turret cannon fire. On the other hand, the bomber can sit tight and wait and his mild evasive maneuvers are enough to throw off the fighters who are limited to 2G and 3G maneuvers. (The use of guided missiles, however, either airborne or from the ground, would admittedly scramble this picture.)

At any event, Air Force emphasis at this stage of the game is on long range, high-altitude bombers as a means of delivering the A-bomb. For example, the recent decision to build additional B-36's and modify them by the addition of four J-47 General Electric turbojets which will jump their ceiling to well over 40,000 feet, highlights the new emphasis on altitude for our strategic bombers.

According to Gen. Hoyt S. Vandenberg, Chief of Staff of the Air Force, in a speech at the Wings club in New York on February 10, 1949, "Tests at Eglin Field have shown that above 30,000 feet the B-36 cannot be intercepted successfully by our current jet fighters. They show that the difficulty of interception increases as the square or the cube of altitude. A slight turn by the bomber throws the attacker out of position and he cannot regain it."

As for interception, General Vanderberg said, "Within that range (150 miles early warning radar range) the B-36 is but a half hour away (from the target) and at above 40,000 feet and at better than 300 m.p.h., we do not believe fighter planes can be 'scrambled' in time for effective interception."

The main reason for the superiority of bombers above 30,000-40,000 feet lies in certain basic aerodynamic facts which tend to curtail severely the tactical maneuverability of present-day heavily-loaded subsonic fighters. As the altitude increases they are caught in an ever-tightening squeeze-play between a steadily increasing stalling speed and a constantly decreasing maximum speed due to compressibility effects. That is, they are caught in the corner between the altitude ceiling and the sonic wall. At some altitude the critical Mach speed drops down to the stalling speed. The fighter is trapped—and the pilot can watch himself being trapped on his airspeed indicator. Perhaps we can visualize the mechanics of the phenomena by riding along with him.

Present-day airspeed indicators used on all high-speed planes have a moving red Mach needle or pointer, the movement of which is established by presetting the instrument to the basic critical Mach number of the plane—0.7 or 0.8, for example. This Mach pointer automatically moves at all times to the *indicated* airspeed at which compressibility effects will occur. Consequently, it automatically moves to lower indicated airspeeds as the altitude increases since the speed of sound is 762 m.p.h. at sea level but is only 662 at 36,000 feet and above—in the stratosphere. A high-speed fighter with a critical Mach number of 0.85 thus encounters compressibility effects at a true airspeed of about 560 m.p.h. or 340 m.p.h. *indicated* at 36,000 feet.

Then there's the usual red line on the face of the indicator marking the stalling speed, which increases somewhat with

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Mach number but is constant with altitude. These two speed limits define the flyable range of airspeeds for the plane and in between these limits moves the black airspeed needle showing the actual *indicated* airspeed that the plane is flying.

As the fighter pilot flies closer and closer to his altitude "roof," or absolute ceiling, the red Mach needle crowds the black airspeed needle back against the red stall line and the pilot literally can see himself being squeezed by this interplay of nature's forces. The speed *range* between stalling and the onset of compressibility decreases until it becomes zero—at the "altitude barrier." It is physically impossible for a plane to fly above its altitude barrier—just as it is impossible for it to fly through its sonic barrier. The sonic barrier limits the speed, the altitude barrier limits the altitude.

For example, when on March 22, 1948, Group Captain Cunningham, Chief Test Pilot for the de Havilland Aircraft Company of England set a new world's altitude record of 59,492 feet in a *Ghost* turbojet-powered de Havilland *Vampire*, he found he could fly only at speeds between 125 m.p.h. and 150 m.p.h. *indicated* (about 400 and 465 *true*—or Mach 0.6 and 0.7) at this altitude. That is, his indicated stalling speed was 125 m.p.h. and his indicated critical speed for compressibility was 150 m.p.h. He had a 25 m.p.h. speed range and could only fly within these limits. At 150 m.p.h. he would have encountered buffeting from shock stall followed by loss of control. At 125 m.p.h. he would have encountered buffeting from a normal stall and would also have lost control. (In fact, in this case, after stalling in the normal manner, he would probably have fallen off in a dive and in doing so, increase his speed until he shock-stalled before effecting recovery.) At any event, he couldn't fly faster than 150 m.p.h. or slower than 125 m.p.h.—and he couldn't fly higher.

This small speed range of 25 m.p.h. would allow only a theoretical 1.45G maneuver! His combat effectiveness would have been nil.

This is the predicament fighters get into at high altitude. Bombers, on the other hand, while subject to the same interplay of forces, can sit tight and force the fighter to attack. Their effective combat ceiling is always higher for the same set of conditions since they do not have to assume the offensive, therefore they do not need the same maneuvering margin that the fighter does. The basic problem of the fighter, then, is to increase its speed range and hence its maneuverability to at least 3 or 4G's to allow reasonable turning radii.

The upper speed limit, of course, can only be increased by increasing the critical Mach number of the airplane by giving it a supersonic shape. The lower limit is established by the wing loading and the wing's maximum lift-coefficient—a value that cannot be materially improved and which, at any rate, is rather low with the flaps retracted. "Maneuvering" flaps to help this condition have been proposed. To spread the speed range, the upper limit can only be pushed upward by designing for supersonic speeds while the lower can only be pulled down by decreasing the wing loading. These two factors establish the fighter's altitude maneuverability and combat effectiveness and determine the altitude barrier. The barrier thus is a potential absolute ceiling and can only be reached if there is enough power to push the fully stalled plane along at its critical Mach speed! The power needed to do so, of course, is fantastic and at any event the plane must be flown below this to have any speed range or maneuverability.

RUNT PROPS

PROPELLERS took a new twist in the 1948 Goodyear Race at Cleveland. Herman (Fish) Salmon's winning *Cosmic Wind* (above) was equipped with an unusual Sensenich prop. Its diameter was cut to 58 inches, with pitch at three-quarter radius reported at 58 inches. Coupled with small blade area and extra-large diameter spinner, this produced high r.p.m. and quick acceleration. Salmon's thin-bladed prop did not have conventional metal leading edges (which cut propulsive efficiency).

Another propeller innovation on the midgets was Steve Whitman's saber blade (below), designed to cause a change into low pitch under high thrust loads on take-off. Blades are thin and flexible so the twist can occur.

For planes of similar critical Mach numbers, the wing-loading is a proper index for gauging the effective combat ceiling. Glancing at the published wing loadings of various bombers and guessing at their combat wing loadings (take-off gross weight less fuel for 40 per cent range) we can quickly see which are our high altitude planes.

Using the *Vampire's* 25 pounds per square foot wing-loading at 60,000 feet as a yard-stick, we can see that none of our bombers are good—even potentially—for more than about 50,000 feet. The Northrop XB-35, the prop-driven version of the B-49 jet flying-wing, has probably the lowest wing loading of any American combat plane—slightly above 30 pounds per square foot. The B-49 is probably next with about 35; the B-36 with 45; the B-50 with 70; and the B-47 about 85. These figures, incidentally, compare with World War II bombers with the B-17G at 30 and the B-29A at about 60. In other words, the medium range B-49 (not yet operational) and the long range B-36 (two groups already formed) are our high altitude bombers and both are good for over 40,000 feet. The high wing-loading of the fast B-47 in this respect is noteworthy. Its *forte* is speed, however, and not altitude or range.

As to the fighter picture, our fighters seem to have consistently higher loadings than those of other countries. Our present first-line operational fighters like the F-80, F-84 and F-86 average 55 pounds per square foot under combat conditions and the new fighters will be considerably heavier. British fighters average only about 45, while the Russians are believed to lie somewhere in between and follow German practice at about 50 pounds per square foot. British fighters then, would seem to have definite advantages at altitude.

Several jet interceptor-type aircraft which are not yet operational also seem to have good altitude potential. England's de Havilland 108 sweptwing tailless research plane has a reported wing-loading of only 30 pounds and holds the world's closed course speed record at 605 m.p.h.—attesting to its high speed maneuverability. It has also passed Mach 1.0 in a dive. The Navy's new Chance-Vought *Cutlass* (XF7U-1), a tailless sweptwing with a relatively small aspect-ratio, is designed as a high-altitude high-speed interceptor and in spite of its odd appearance is the logical design arrangement for this type of plane. With two axial-flow turbojets and after-burners, it would seem to have the power necessary to exploit both its high speed and high altitude potentialities. The Air Force's McDonnell XF-88 is another experimental fighter with unusual speed and altitude capabilities. In fact, this plane may well be the Air Force's best high altitude fighter.

Essentially, however, these planes are fighters rather than interceptors, although the dividing line is rather vague and indefinite. Interceptors are designed specifically for very high rates of climb and good altitude performance but have very little range. Consequently, all rocket planes are inherently interceptors since their high fuel consumption keeps them close to their home base. In this respect, the first rocket interceptor—the Messerschmitt Me-163, later developed into the Me-263, is still very much a "live" design in that it is known that Russia captured the Junkers factory at Dessau, Germany, (which was building them for Messerschmitt) and with it a number of the latest models.

It is believed that the Russian plane clocked over Korea at better than Mach

1.0 was a version of the Me-163. At any event, Russia has the engineering data, technicians, and even the production tooling and it is known that they are continuing its development with the original German engineers. The 163 could go up to about 60,000 feet since its wing-loading dropped sharply as it climbed—from 42 to 21 pounds per square foot. Having a basic critical Mach number of about 0.85 (sweptwing) this basic design still has a lot of development life left and could easily be made operational again.

The same holds true for the Messerschmitt Me-262 model with the auxiliary rocket motor which is also in the hands of the Russians. At any event, when we say that present-day fighters are incapable of fighting effectively above 40,000 feet we must qualify this statement with the unknown operational status of certain rocket interceptors known to exist.

Living on a large continental land mass, as we do, we have never developed interceptors but have concentrated on relatively long range general purpose fighters for bomber escorts. However, the recent discovery that our own bombers were out-maneuvering our fighters above 40,000 feet has quickly pointed up the need to develop interceptors while simultaneously shoving our bombers up even higher. For what we can do the enemy can also do. He too can penetrate our continent with high altitude bombers. Consequently, there has been considerable interest lately in setting up the requirements for interceptors and it is quite probable that they will be added to the Air Force as a basic type.

There are certain basic differences between a plane designed for high altitude and one designed for high speed aside from their wing and power loadings. Ironically enough, the very design features that make for high speed tend to lower the altitude performance. Since the maximum maneuverability of a plane at high altitude depends on the maximum lift coefficient of the wing, high speed airfoils with sharp leading-edges (laminar-flow type) and swept planforms have lower maximum lift-coefficients than do straight wings with moderate thickness and camber. These types have a low critical Mach number and are hence unsuited for high speed, but are suited for high altitude.

We can expect to see high altitude fighters built with radically reduced load factors. Present day fighters are designed to withstand 10 to 12G's even though at altitude they can actually develop only 2 to 3G's. This high structural weight is of no use and, in fact, actually hinders the fighter from maneuvering at altitude. We will eventually see "high" altitude interceptors and "low" altitude fighters, with the stratosphere types designed only for the G loads they can actually develop.

Many new problems are posed by the operation of aircraft at high altitude. The atmospheric conditions above 36,000 feet —the gateway to the stratosphere—are supposed to be stabilized at −67° F. with a definite pressure and density relationship. Recent flights in B-36's, however, have encountered temperatures as low as −97° F.—some 32° below the specified −65° that all Air Force equipment is designed for. Bomb bay door actuators, electric motors, hydraulic equipment, etc., must all be retested and possibly redesigned for the maximum conditions to be encountered. Jet engines also become balky at high altitude, tending to flame out at reduced throttle settings while restarts are difficult or impossible. Also, jet engines lose about 80 per cent of their thrust at 40,000 feet—the thrust becoming zero at about 65,000-70,000 feet.

Comfortization of the cabin and safety devices and techniques are also in for renewed study. Even 40,000 feet is in the "capsule" region where the crew must bail out in pressurized capsules in order to survive. Pressurized suits may also be needed, for if the pressurized cabin blows out or is damaged from gunfire, it is impossible to live even on oxygen because of the differential pressure between the human body and the outside atmosphere. "Bends" in the air are just as possible as in underwater operations.

Visibility is another problem in the stratosphere. A peculiar haze has been reported at about 55,000 feet which obscures the horizon while the sky appears black. Due to the absence of all dust particles in the air, there is nothing to diffuse the sun's rays; therefore, the cockpit is in deep shadow everywhere but where the sunlight strikes.

At any event, high altitude will soon be standard operating procedure and the difficulties of the altitude barrier, while different from those of the sonic, are nevertheless scheduled for solution. Present types of aircraft with present oxygen-breathing power plants may no longer be practical above, say, 60,000 feet. Then the rocket engines take over and carry their oxygen with them. The tactical advantages of operating in the 40,000 to 60,000 foot belt pose a sharp challenge to our military designers and tacticians. But the altitude tactical cover—for the present at least—is a practical stratagem for our long-range strategic bombers carrying the atomic bomb. END

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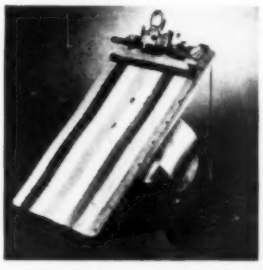

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Own Your Plane?

(*Continued from page 42*)

news for me. In cases like this, the law reads that the lien stands and must be paid. Who pays it? Anyone who has the money. If the present owner in Pittsburgh didn't pay, the finance company could take the plane away from him. He could in turn sue my student who had sold him the plane. My student could in turn take me to court and collect from me. How about me? I could try and find the factory distributor. Then, if I found him, I could sue him. There were just two hitches. I didn't know where he was and if I found him he had to have money before I could get it. What a mess!

My lawyer explained that I should have come to him when I bought the plane. He would have instituted a search in the county where the factory distributor operated. If no lien was filed there, and the factory had been paid, the title was clear. A search in the county records would have revealed the $1,800 lien filed against my ship. He explained that I was lucky. I didn't feel lucky. Of the two ships I had purchased, the second was really mine. This distributor must have forgotten to borrow on that one.

We contacted the factory and told them the story. They were sympathetic and explained that similar cases had been brought to their attention. At least I wasn't the only sucker around. There were others. It was mighty poor consolation. There was one redeeming factor. The factory had heard that their old representative was in South Carolina. They didn't know just where, but had heard he was instructing at an Army primary school there. Meanwhile, the company holding the lien was hot after the poor fellow in Pittsburgh. He, in turn kept his lawyer haranguing my student. I was the goat. I had no one to harangue. I made up my mind to get some one and quick.

I explained my woes to the C.O. at my base and he arranged a delivery flight via South Carolina for me. A little sleuthing did the rest. I found my man. I said nothing about the matter to him but notified my lawyer at once of his whereabouts. We threatened him with suit and jail. He decided to pay. He didn't have the money but jail is a mighty miserable place. I don't know where he got funds to pay off the lien, but pay he did, and everyone was happy. The guy in Pittsburgh kissed my student. My student again decided he could speak to me. All I had to do was pay the lawyer. But $200 is $1,600 less than $1,800, isn't it?

That's the end of the unhappy yarn. The lesson it teaches is clear. I offer these rules for plane buyers to follow.

1. If you buy or sell a plane, check the title. Hire a lawyer to search county records for liens. That's where they must be legally filed.
2. Don't take anyone's word or signature for anything. Check your title.

The CAA records liens listed on bills of sale forwarded to Washington. They try to do their best. Unfortunately, they have no law with any teeth in it to back them up. Fortunately for everyone concerned, only a minority are unscrupulous enough to use this legal loophole for their own gain. No lien is valid unless it has been filed in the county where a plane is sold. If you are buying a used plane, with several previous owners, a proper search would have to include each county where a sale was made. Look at what happened to the poor guy in Pittsburgh. I hope this article doesn't start a mad rush to the county clerk's and lawyer's offices. But in the future, be sure to check your title. END

Piper Clipper

(*Continued from page 39*)

I lowered a wing, using full aileron during each type stall, but the *Clipper* returned to a wing level position at once.

I tried stalls from climbing and gliding turns, some with crossed controls, coaxing the *Clipper* to spin. The most I could coax was a skidding turn. The *Clipper* is placarded against spins so I did not attempt any intentional spinning. This is the first lightplane with conventional controls I have ever flown which would not spin from a nose high full cross control position (stick three-quarters of the way back). I cannot see how anyone exercising reasonable caution could find himself in an accidental spin.

I descended into the airport pattern and tried a few landings. With pilot and one passenger, I found 70 to 75 m.p.h. to be the best gliding speed. With the 25 m.p.h. wind blowing there was very little floating tendency near the ground when I broke the glide. Approaches at 80 m.p.h. also revealed little floating tendency. This is probably due to the short wing span, 29 feet, 3 inches. Despite this short span, wing loading of the *Clipper* is only 11.2 pounds per square foot compared with 15.5 pounds in the Piper Stinson.

I made several landings with two persons in the plane and found the *Clipper* lands well either three point or on the wheels. Hold stick all the way back and stabilizer (overhead crank) slightly tail heavy for three pointers. Adjust trim a little nose heavy and relax back pressure when you touch, for a smooth wheel landing. The landing is exceptionally soft for a shock cord type gear. It reminded me of the old *Cub Coupe* hydraulic gear.

I returned to the hangar and swapped passengers. The local pilot got out and Jim Mac Veigh, the Piper salesman from Atlantic Aviation, climbed in beside me.

With Jim for my passenger, I made several take-off runs against time and distance. The *Clipper* will break ground in a surprisingly short distance if you horse it off the runway. I found that with no coaxing, just waiting for it to fly off with a little help from me, the plane required eight seconds or 800 feet.

The landing roll with no brakes is about the same as take-off run—800 feet. You glide in at 75 m.p.h., start to bring the nose up gently at about 20 feet off the ground and the airspeed falls off gradually. 70 . . . 65 . . . 60 . . . and at 50 m.p.h. indicated, the *Clipper* touches the runway. If the SFI were working it would buzz just when your wheels touched the ground.

I tried two or three approaches coming in intentionally too high. The *Clipper* slips nicely but not violently. There is more rudder than opposite aileron travel, so if you try to boot full rudder the plane will turn away from the runway in the direction of applied rudder. This presents no problem. Simply use only enough rudder to equalize the available aileron. The result is a moderate slip which cuts down plenty of altitude.

I lined up a 20-mile (40-mile round trip) course directly into and down wind for checking the *Clipper's* true speed. At 2400 r.p.m. the plane indicated 118 m.p.h. Averaging the time with and against the wind, the ground speed figured 122 m.p.h. at 1,000 feet altitude.

Cruising at 2200 r.p.m. the ground speed still averaged 112 m.p.h. Piper estimates gasoline consumption at cruising throttle is 7 gallons per hour with the mixture set at full rich. Leaning the mixture (control at left side of dash) cuts this consumption to 6.2 gallons per hour. During my own flight check of the *Clipper*, which included take-offs, landings, climbs at full throttle, taxiing, stalls, etc., the gasoline consumption was just 6 gallons per hour.

By 1:00 p.m. I had checked the *Clipper's* performance thoroughly with two people aboard. We had been flying on the wing tank (left wing 18 gallon capacity) and the tubular float gauge still showed several gallons left.

We landed and switched to the fuselage tank (under dash panel, 12 gallon capacity) for another flight, this time with four passengers. Figuring empty and gross loads along with gasoline aboard, I discovered an unusual condition. The empty weight of the Piper Clipper is only 850 pounds. The gross load is 1650 pounds. This means that the PA-16 can legally carry 800 pounds of useful load—almost its own weight.

Our four passengers (including your 215-pound pilot) averaged 170 pounds each. I had to locate a few hungry pilots to arrange that. (No difficulty experienced here.) The remaining gasoline, six quarts of oil and the two-way radio brought us up to within a few pounds of gross weight.

The wind had decreased to 15 m.p.h. for my flight at full gross weight. Except for increasing the stalling speed about 5 m.p.h., I found little change in flight characteristics with four persons aboard the *Clipper*. The take-off run increased by a few seconds and about 300 feet—to 1,100 feet. This undoubtedly was due partly to the decreased wind velocity.

As previously explained, it is possible to haul the *Clipper* off sooner but if you don't hurry things it flies itself off in

plenty of time. The rate of climb decreased with four passengers from 900 to 600 f.p.m. The best gliding speed with four people aboard is 80 m.p.h. Stalls with power occur at 45 m.p.h. with gross weight 1650 pounds. Without power the PA-16 stalls at 50 m.p.h. with full load.

Cruising speeds are off about 10 m.p.h. with two passengers in the back seat. At 2400 r.p.m. the true speed dropped from 122 with two passengers to 112 with all seats occupied. At 2200 r.p.m. the speed drop was from 112 to 102 m.p.h.

PIPER PA-16
Type Certificate No. 1A1
One air-cooled Lycoming 115-h.p. engine

Gross weight	1650 pounds
Empty weight (standard)	850 pounds
Wing span	29.3 feet
Overall length	20.1 feet
Overall height	6.2 feet
Power loading	16.2 lbs./hp.
Wing loading	11.2 lbs./sq. ft.
Baggage capacity	50 pounds
Top speed	125 m.p.h.
Cruising speed	112 m.p.h.
Stalling speed	50 m.p.h.
Take-off run	720 feet
Landing roll	600 feet
Best rate of climb speed	75 m.p.h.
Rate of climb	600 f.p.m.
Cruising range	480 miles
Absolute ceiling	13,500 feet
Fuel consumption (full rich)	7 g.p.h.
(lean)	6.2 g.p.h.

There are several *Clipper* features in addition to performance data which should interest both private pilots and airport operators.

The front floor space in the PA-16 is clear. This is accomplished by using curved sticks which attach to the control socket underneath the front seat. The right stick is removable, and a clip is provided for its storage under dash when not in use. The front seat is adjustable fore and aft.

The rear seat passengers will find the high padded seat back offers added comfort during long flights. Four-passenger range is approximately 250 miles. The front seat is raised high enough off the floor level to allow the rear passengers plenty of leg and knee room. You can slide your feet up under the front seat. The rear seat is easily removable, making the entire rear cockpit and baggage compartment one large cargo area. The rear door opens flush with the floor level for easy loading of heavy items.

I overheard one of Atlantic City's operators criticizing the door arrangement in the PA-16. He felt that the front door should have been built on the left (pilot's) side of the *Clipper*. This would also require reversing the rear door to the right side of the plane. This arrangement certainly would make it easier for the pilot to climb into the driver's seat. It would also make passenger entry into the front right seat especially for a woman more difficult. I found the present arrangement quite satisfactory.

Considering the high cost of labor and materials today, I think Piper has accomplished miracles in producing the lowest priced four-place airplane in history. There can be no doubt that many *Clippers* will be flying in and out of your field in the months to come.—BEN ROBIN

How I Did It

(*Continued from page 21*)

in the pre-computed courses were necessary because the fixes were falling so close to the dead reckoning position.*

My power settings were: Take-off at 2300 and 30 inches and climb at 2050 and 25 inches to 5,000 feet, then cruise at 1850 and 22 inches for the first six hours. Then I reduced the r.p.m. to 1750 and gradually reduced the manifold pressure throughout the flight until I ended up over New York with sixteen inches. The power reduction was indicated by the air speed. I flew a slower air speed as the gross weight decreased and maintained my pre-computed *optimum* air speed by reducing the manifold pressure. I also increased my altitude from about half way over the Pacific until I got to California. During this gross weight change which was occurring during the last half of the trip crossing, the *optimum* altitude increased to about 11,000 feet.

About 900 miles out of Honolulu the B-17 blinked his landing lights and said goodbye over the radio. I then had to look forward to at least some 1,100 miles alone and perhaps farther over the Pacific, because at that time I didn't know for sure that the Coast Guard was sending an escort plane out from San Francisco or if we would be able to make contact with one another even if they did.

As the B-17 left me, I was homing on *"Red Head Fox,"* the Guard ship which is operated by the Coast Guard. With my Lear automatic direction finder tuned to 429 kilocycles I could hear this station about 300 miles away, and passed right over it. Shortly after passing over *"Red Head Fox"* I contacted KSF, the CAA overseas communication station in San Francisco.

KSF advised that they had a message for me. My answer was that if it was not important to please wait until daylight, because it is much easier to fly the airplane and copy code at the same time in daylight than at night. My experience with TWA as a radio operator back in 1937, '38, and '39 was about to pay off. KSF went ahead with the message which they said was important—and it was.

"San Francisco advises bad storm along Honolulu—San Francisco rhumb line between 140 west and 135 west, with severe turbulence and hail." The Weather Bureau suggested course about 100 miles south of rhumb line to decrease thunderstorm activity. I immediately altered course to a heading which would carry me on the suggested course.

I watched the speed, and bounced along for about an hour and a half. I sent dead reckoning positions to San Francisco, although by this time I was receiving KGO on my ADF even though I was about 1000 miles out from San Francisco. By 9:30 to 9:45, I was breaking out of the worst part of the thunder-storms and could see the sea boiling beneath me. It looked as

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though a southwest 25-knot wind was blowing which made me feel good.

At 9:55 EST I received another Weather Bureau forecast which gave me the wind over the remaining course from my present position to Honolulu. The CW two-way communication was working perfectly and I was actually having the time of my life batting away on the key and copying code. I started out in aviation as a radio operator and, since learning to fly, have had very little time to indulge in operating CW.

I radioed San Francisco at 10:17 to inquire if air-sea rescue was coming out to meet me. San Francisco advised immediately that a Coast Guard PBM, No. 4736, had departed San Francisco. His position at 16:07 Greenwich Time was 35° 56' north and 126° 29' west on a course of 242°.

I could then hear the Coast Guard PBM on 6570 and established communications directly with him. He sent me his estimated time of interception as 18:12 Greenwich Time—that would be about another two hours.

When the VHF signals from the PBM became very strong at 12:07 EST and the ADF began to walk back and forth, I knew that we were very close. I asked the PBM to stop and circle so that I could home toward him, since, if we passed very close to one another on instruments or in a rain squall, the bearing change would be so rapid that we couldn't maneuver fast enough to keep up with them and we might never contact one another.

I was at 5,000, and he was at 6,000 on instruments. I asked him to circle, and when the ADF began to walk back and forth I knew that he was making too wide a circle, so I asked him to tighten up the circle. He did and the needle settled down and I continued homing. When the signal was just pounding in I asked him to spiral down to 5,000, as I was contact at that time and thought that I could see him. At 12:12, out of the overcast directly in front of me came a Coast Guard PBM. I advised him to make a turn and come in north-northwest and he would see me. At 12:13 he sent me three letters "I See You." We joined up and flew east at 7,000.

We gradually climbed until we passed over the California Coast at 11,000 feet. American Broadcasting had a recorder set up in the PBM and we made several recordings and photographs. We talked back and forth on VHF and the PBM sent my position reports in to California via CW. The navigator of the Coast Guard plane was really sharp; he sent an ETA for the San Francisco Golden Gate Bridge as 1:51 p.m., Pacific Standard Time, and we went over the bridge at 1:51 p.m. on the nose.

Throughout the flight I was eating a diet which had been prescribed by Dr. Fiske in New York prior to my solo round-the-world flight in the Reynolds *Bombshell*. This consisted of a few chicken sandwiches, eaten every three or four hours, with hot tea, orange juice, almond chocolate bars, fresh tomatoes, and an occasional banana. I drank a lot of water—in fact over the Pacific Ocean I could hardly drink enough water. I was thirsty constantly.

A few hundred miles off the coast of California, a B-17 also picked us up, then a B-29, and by the time we passed over the Golden Gate Bridge, many twin-engined aircraft and a few single-engined planes had joined up in the loose formation.

From the San Francisco CAA communications station I received the message that the weather over the Rocky Mountains on the airway course through Reno and Salt Lake was covered with severe icing and snow squalls. They advised me to swing up over Lakeview, Ore., Boise, Ida., and back down over Sinclair, Wyo., and direct to Omaha. This did not avoid the weather but it decreased its intensity. I went on oxygen and flew at 11,000, then 13,000, and as high as 16,000 trying to stay on top. I was partially successful in doing so. Then I dropped back down to 13,000, varying my altitude to either side of that to try to stay between layers. I used a lot of excess fuel flying the airplane above its optimum altitude of 11,000 feet and revving the engine up to high r.p.m.'s to throw the ice off the propeller.

The navigation from San Francisco over Lakeview, until I was homing on Boise, was by dead reckoning only. From Boise, I used my ADF, homing on the next station I had right down the airway to Sinclair. Then I went over Scotts Bluff and gradually slid into the airways as I approached Omaha. I broke out of the bad weather after passing Scotts Bluff and settled back to efficient cruise.

I picked up some favorable tailwinds and the rest of the flight was a breeze. The *Waikiki Beech* burned only 40 gallons of gasoline—an average of 28.5 miles per gallon—between Omaha, Neb., and Teterboro. I was over Omaha at 4:42 a.m. EST, Chicago at 7:15 a.m. and Cleveland at 9:11 a.m. During the entire flight my groundspeed varied only between 144.2 m.p.h. and 149.4 m.p.h. It averaged 146.3 m.p.h.

Thousands of people were at Teterboro to meet me when I landed at 12:06 p.m. after a flight of 36 hr. 2 min. There were still 15.75 gallons of gasoline left in my tanks, which would have been enough to cruise the *Bonanza* 372 additional miles. If it had not been for the fuel-consuming detour over the Rockies, which was necessitated by bad weather, we could have flown an additional 1,000 miles.

Although my ground distance covered was officially 4,957.240 miles, because of my detours I actually covered 5,273 miles on 272.25 gallons of gasoline. Thus I consumed 7.56 gallons per hour for the entire flight, and averaged 19.37 miles per gallon. The 80 octane gasoline was chilled to 20° F. to permit a greater weight to be stored in the *Bonanza's* tanks. It cost about $75. It would have cost me approximately the same amount to drive my car the same distance. END

Mr. Johnson

(*Continued from page* 33)

of Secretary Woodring and Johnson was to inherit his job. But, trapped by time—1940 was a presidential election year—Mr. Roosevelt sacrificed him. On the eve of the Republican convention the President shrewdly appointed Republicans Stimson and Knox to War and Navy. Johnson returned to his law practice without showing any outward bitterness.

One thing is sure, as one of the new secretary's close associates puts it: "Louis Johnson certainly isn't afraid of taking a chance."

Johnson, who has left a highly profitable law practice in New York, Clarksburg, W. Va., and Washington, to become Secretary of Defense, is apparently not only unawed at taking a chance, but is willing to wring every possible advantage from it.

He took a chance again last fall when he collected $1,500,000, and personally underwrote $250,000, for what appeared to be a collapsing Democratic party.

So it is natural that Johnson is being widely dubbed a politican. His appointment, likewise, has been described as everything from a crass payment in kind for a political favor to an expression of genuine gratitude for party loyalty during those dark days of 1948. But strangely enough, the Republicans, who might have been expected to make loud outcries, showed little or no concern over the alleged politicking with an office of great importance and responsibility and the Senate approved him with silent enthusiasm.

For a politician, the defense secretary is remarkably thin-skinned, and suggestions that he would play politics with the national security bring hurt looks and indignant denials from him.

He points to a cartoon that appeared in The Washington Evening Star two days after his appointment was announced. The drawing was a bit of advice and showed Johnson, beaming confidently, about to enter a door marked "Secretary of Defense" carrying an overflowing brief case labeled "Politics."

"Better leave that bag at the door," said the caption.

"I intend to do just that," Johnson told a reporter in making a request for the original drawing.

As evidence, he has invited a hard-working Republican to be one of his aides. He is Col. Paul Griffith. But the Griffith appointment brings up another point on which Johnson critics harp. The colonel is a former national commander of the American Legion. And so is Johnson.

Will the American Legion move in on the defense establishment? Johnson becomes equally indignant at that question.

"The American Legion will not run the military establishment," he declares. "As for Paul Griffith, he is here to answer veterans' queries—for which he is admirably qualified."

Johnson says that he will not bring into the Pentagon a horde of new office hold-

ers; that he will keep the staff which Forrestal built up. Nevertheless there is expected to be a gradual change-over as Johnson men move slowly into the key spots.

The new secretary has every outward appearance of a politician and even the fine bald head which, since the rise of James Farley, has come to be regarded as the trademark of the political careerist. He has, in addition, the commanding size of the political leader; he stands 6 ft. 2¾ in. tall and is down to a fighting weight of 192 pounds (he played football at 191 for the University of Virginia). He credits golf and diet with having cut him down from 236 pounds a year ago.

Those who have known him longest are saying: "Louis can't be written off simply as a politician, or a lawyer, or a rich man, or a Legionnaire, or anything else cut and dried. He is a good deal more complex than he seems."

As these friends suggest, Johnson's personality depends on where you catch him. His voice is a good example; he has two voices. His conversational tone is low, smooth, quietly jocular and free of profanity, save for an occasional "damn." But from the rostrum his voice has a booming, enjoining quality that sends out decibels to the far corners of the auditorium. There is a touch, too, of the spellbinder's authority and prose style.

The military brass is literally fearful of where the lightning will strike next. They are convinced of one thing, though. He is decisive; he believes in moving fast. His immediate decision to reshuffle military offices and concentrate them in the Pentagon over a period of 90 days, compared with a 2½-year program planned under Forrestal, is an example.

And the tremendous moving process which turned the huge structure upside down and gave it a good shaking out in the meantime provides an example of just who now is boss of the military and also, perhaps, something of Johnson's lack of tact.

Johnson swapped offices with Secretary of the Army Royall, thus providing himself with probably the best and most elaborate suite in Washington.

Late one afternoon Johnson and entourage decided to inspect the new quarters. Walking into the Army Secretary's offices—the building was built by and for the Army—an aide informed Johnson that Royall still was at his desk.

This did not deter the new defense chief.

Unannounced, he opened the door on a startled Royall.

"Hello," said Johnson, "just looking around—don't let us disturb you."

Shortly, he completed his tour of the private sanctum and returned to the outer offices, all the while directing aides where things should go.

"And we'll put the kitchen into this space," he finally said.

An aide said meekly:

"But Mr. Secretary, there's a galley right across the hall which Mr. Royall found satisfactory."

"Mr. Royall will not be here any more," was the terse reply.

There are many elements of paradox and contrast in Johnson. He is joiner but not a glad-hander. For a man who belongs to more clubs and fraternal organizations than an eager president of a small-town chamber of commerce (something he is not), his private life is quiet and unimpaired by social obligations.

In addition to having been past commander of the Legion, Johnson is past president of a Rotary Club and past Exalted Ruler of the Benevolent and Protective Order of Elks. He is a Mason, a Son of the American Revolution, a member of the Reserve Officers Association, and a vestryman of Christ Episcopal Church in Clarksburg. He holds cards to luncheon and country clubs from San Francisco to New York. His only regular club date, however, is with the Post Mortem Club, composed of past National Commanders of the Legion, who eat luncheon and swap gossip on Tuesdays.

He was heavyweight boxing and wrestling champion at the University of Virginia. Now he collects jade, raises orchids, shows an interest in all flowers and evokes praise as one of the best amateur botanists in West Virginia.

A big, husky boy from Roanoke, Va., Johnson was known more for his athletic prowess than his scholarship at the University of Virginia. With his law degree, he promptly set out for Clarksburg where he had heard there were unbounded opportunities for young men. He showed talent and made friends. He was elected to the West Virginia House of Delegates in 1916 at age 25. Less than a year later he was majority floor leader.

When World War I broke out he attended Officers' Training Camp, fought with distinction as an infantry captain in the Meuse-Argonne and was decorated as a commander of the French Legion of Honor.

A conservative man by nature and choice, the new Secretary watches the small expenses. "Even though he plumped for a billion-dollar aircraft program while others wanted a fraction of that spent," says a friend, "he's awfully intolerant of small waste."

One of his first moves was to order consolidation or elimination of some 800 military boards and commissions—"too damn many" for the sake of economy and efficiency, he said.

His reading habits are almost all serious—current literature, documents and reports. And, according to a close associate, "he seems to enjoy them."

Intellectuality may not be his principal asset, but Johnson's capacity for winning friends and preserving loyalty undoubtedly will pay him many dividends. He injects a feeling of importance, almost of indispensability into the most casual acquaintances. This is accomplished partly by his own modesty, partly by his interest in their opinions.

Lunching informally with reporters who regularly cover the defense offices the Secretary won them over by asking what they thought of his plans, what they would do, etc. And he appeared to be giving some thought to what was answered.

Johnson has the stamina of an Eleanor Roosevelt when it comes to speaking tours and the country may expect to see much of him during his term. When

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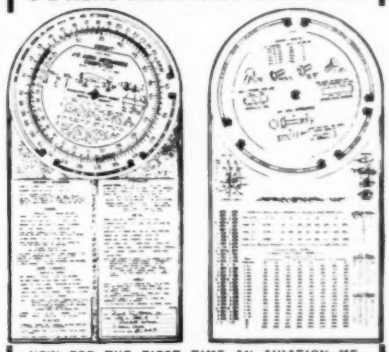

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commander of the Legion he made 177 speeches and visited countless military installations and various points of interest.

But Johnson's accomplishments of a decade ago as Assistant Secretary of War are small by comparison with the task he faces today. Now he is civilian chief of all the armed forces, responsible only to the President and to the Congress.

He stepped in just as the Atlantic Pact nations were making known their needs for arms from the American arsenal. Much of the responsibility for deciding how the weapons can be provided rests eventually with him.

The unification program is still new. The Air Force and the Navy still cannot agree about such subjects as the probable effectiveness of the B-36 compared with carrier-borne aviation. The Army, caught between the clashes of the two glamour services, tries to explain that wars still cannot be won without ground armies.

And in and around and through all this confusion the defense establishment is supposed to revamp and reequip its armed forces to make them ready for fighting atomic-age war.

Amidst this confusion appears the hard-hitting Johnson with a reputation for firmness never before witnessed by the brass hats who run the armed services.

"The size of the defense job we have is not of our choosing," he says. "It has been thrust upon us by the tensions of the world today. Our defense policy will consist in mustering the maximum of strength, within the limits of our economy and our democracy, to back up our foreign policy and make America secure by discouraging any potential aggressor.

"To achieve this goal we shall attain the necessary measure of strength in all three branches of national defense. They will be united as one in the service of the nation. The American people expect it and they shall have it." END

Arabian Oil

(*Continued from page* 15)

cities of the German Reich, aircraft factories and oil concentrations. The *Luftwaffe* lashed back desperately with its heavily armed fighters.

But the German air force, larger in 1944 than when the war started, was outclassed. Its FW-190's were as deadly as any allied fighter planes and its jets were better, but the *Luftwaffe* lacked aviation's lifeblood—oil. While German oil supplies trickled out, the U.S. Air Force was using almost 2,500,000 gallons of gas for each 1,000-bomber raid on Berlin, and another 500,000 gallons for each 1,000 fighters accompanying the attacks. The Nazi surrender, nine months later, showed that when the chips are down oil is a decisive factor.

Today, American air forces need more fuel than ever before. Our heavy piston-engined bombers consume almost twice as much gasoline as the old B-17's and B-24's. Jet appetite for fuel is prodigious. American planes fly faster each day. Almost every passing day finds new marks in speed, capacity and effectiveness in our planes. They have plunged through the sonic barrier. They carry bigger bomb loads farther. But, if a showdown comes, they will be only as good as their oil supply.

The axiom that "in modern war, nations fly to victory on a sea of oil" was never truer than today.

The lure for American development of oil in the Middle East, notably Saudi Arabia, is great. Estimates on the oil available there are awesome in their totals. Arabia is pictured to us as the answer to all our problems in oil.

Arabia is one of the largest and most important petroleum provinces on earth, in a region experts estimate contains 42 per cent of the world's known oil reserve. Definitely, Arabian oil is a great prize.

That is no secret. The great powers cast longing eyes upon the sun-baked deserts of Arabia and visualize teeming communities and the mystic atmosphere that surrounds a vast oil development.

But the Middle East not only contains the great prize of oil, it is the cross road of the world. It is the jugular vein between Europe and the Orient.

American citizens, providing American capital, have a full right to explore with a view to developing oil possibilities in Arabia. Americans engaging in business outside our country are entitled to, and should have, the full protection of our Government in all their lawful acts. I would not close the door to development of oil resources by American interests in Arabia but I do raise some questions which I believe are of a highly practical nature in the present circumstances.

I suggest a weighing of alternatives, although these alternatives may exist only temporarily.

The world political ramifications in the scramble for Arabian oil are extensive. Indeed, there are some students of world history who contend that the possession of oil has a tremendous influence upon world events. It seems to me that the United States in seeking to assure for itself an adequate supply of oil should be cautious against a policy of dispersal which would result in attempting to do much and winding up with very little in the event of a national emergency.

Today the domestic United States oil industry needs steel. This is particularly true of the independent segment of the industry which does not have assured sources of mill supplies. Steel is needed for drilling and operational activities; steel is needed for pipe lines to carry oil; steel is needed for tank cars and tankers. And while increased pipe production in the past year has enabled the oil industry to go forward with oil development, which declined substantially during the war, competent experts tell us that the oil industry today is 50,000 wells behind a necessary production schedule.

Meanwhile, American oil companies with developments in the Middle East are also clamoring for steel to build pipe lines and other installations. The pipe line which is being built across 1,100 miles of the Saudi Arabian desert to an outlet in the Mediterranean will, it is estimated, use approximately 400,000 tons of pipe and other steel. This pipe line, and pipe lines in adjacent oil fields, are carrying an ever-increasing output of oil in the Middle East—some of which will be poured into the United States as well as in Europe and other parts of the world. Already America is importing an ever-increasing amount of Middle East oil. It began to enter the United States in substantial quantities last year when it accounted for 17 per cent of all the oil imported into the United States. By December, 1948, the rate had increased to nearly 30 per cent of our entire imports.

Now let's turn, momentarily, to another development in the gigantic world struggle for oil.

This, too, should be considered for its possible impact upon the oil industry in the United States and that great goal which we seek—adequate oil, readily available to power and indispensable to our Air Force and to keep the wheels of American industry going. I refer to the huge oil development program projected by the British government for the fiscal year 1949-50.

Official British government plans for oil development submitted to Congress during consideration of the authorization recently for the Economic Cooperation Administration disclosed that Great Britain proposes to spend half a billion dollars in oil prospecting and oil development in the Middle East, Africa, the Western Hemisphere, and the Far East. No estimates were submitted on how much of that $500,000,000 is to be provided by the American taxpayers through ECA. It was explained that the funds will come out of the general treasury of the British government in which are mingled the so-called "earned" dollars and the gifts by the American taxpayers through their Congress. But it was made quite plain that the British government is embarked upon a gigantic program for acquisition of oil and that Great Britain intends to convert much of that oil into hard money by shipment to the dollar areas which, of course, include the United States.

The report of the Economic Cooperation Administration Mission to the United Kingdom, which was presented to Congress by the Economic Cooperation Administration in connection with the ECA authorization, said:

"An important feature of the expansion programme is the development of refinery capacity. A large industry will be established within the United Kingdom capable of treating nearly 20 million tons of crude oil a year, compared with a through-put of 2½ million tons in 1947. Seven new refineries or major extensions will be erected in the United Kingdom at an approximate cost of $500 million. Work has already begun on three of them. This ambitious project will make a major change in the oil position of the United Kingdom. Imports of crude oil will increasingly replace imports of refined

products and give rise to large savings in foreign exchange. The new plants will result in a much greater variety of products being refined in the United Kingdom and will stimulate the development of a petroleum chemical industry capable of producing many organic chemicals now imported from hard currency sources. Refinery capacity owned by British companies outside the United Kingdom is also being increased considerably. A new refinery is now under construction in Venezuela, while increases in capacity in Holland, the Middle East and the East Indies are already underway or planned. Capacity overseas will be increased by more than 40 per cent compared with 1947."

That ambitious program, no doubt, is being considered by the American oil industry, especially the countless thousands of independent companies and individual prospectors for oil, as they clamor and plead for more steel, more tools and more of everything necessary to catch up in our development of oil sources at home for time lost during the war.

There is abundant evidence that Great Britain, France and other countries receiving ECA contributions from the United States have surpassed their prewar productivity. ECA no longer is a program for relief to destitute, hungry and miserable people in Europe. Those needs have been met. ECA is now a program to finance recipient countries in their plans for goals of production and world commerce never before attained.

The full impact of those programs upon the American economy will become heavier and heavier as the months pass and they have an important bearing upon the subject of this article—oil.

Hardly had World War II ended when some Americans, highly placed in our Government, joined in a dirge that the United States petroleum resources had been so heavily depleted that the nation could never again "oil another war."

They said discovery of new sources of petroleum in the United States would steadily decline and that we must therefore cast ourselves upon foreign sources and forever become dependent upon foreign oil, in peace as well as in preparedness against war.

Competent experts say these pessimists were wrong. The United States today is said to have a surplus of oil. Statistics are quoted to show, also, that the United States has 25 billion barrels of proved oil reserves and possibly 100 billion barrels as yet undiscovered. We are told the Western Hemisphere has 35 billion barrels of proved reserves and possibly 210 billion barrels still undiscovered. These estimates do not even tap the hidden reserves in oil recovery from coal and shale experiments which have just begun.

These are formidable figures. I do not vouch for them but much testimony has come to me that there is a more urgent demand among our American citizens, our oil industry, for steel and other essentials for development of the oil which is in America's own back yard.

Have we overlooked many of the potentialities of the American Arctic, Alaska, Brazil, Mexico, and the Continental United States in oil? Have we been casting our eyes across the Atlantic and across the Mediterranean to Arabia for oil when we could be better spending time and effort in exploring closer to home?

We should take a long range view of this matter, for oil is indispensable to an industrial nation. In the event of a Communist-inspired global war, United States oil men and American forces in Arabia would find themselves staring down the muzzles of Russian guns. The Red Army, say military authorities, could surge from its borders into Turkey, Greece and Italy within days. Red paratroopers could descend on Middle East oil fields within hours, perhaps could capture many of the wells intact. And even if the Russians were halted for a few weeks, Middle East oil would be of little use to America. We would gain time only by dynamiting the wells.

Those who plead for first emphasis upon development of our domestic oil industry argue that the Middle East would echo to the rumbling of blasts if we destroyed oil fields built in Arabia at the expense of the Western Hemisphere petroleum industry.

I do not presume to be a military strategist and, much less would I attempt to pinpoint the spot, or spots on the globe in which the next war—God forbid that it come—will begin, but I do not believe one needs to be a military strategist or tactician to realize that air power is now the dominant weapon in warfare.

One does not need to be a military strategist or tactician to know that airplanes can fly in any direction, even over the Arctic Circle, both ways to reach an objective. It is obvious that we require a substantial, adequate supply of oil within Continental United States in the event of another war and it is for that reason I raise these questions on where the emphasis for oil development should be placed in the immediate future and in view of present circumstances which plainly reveal an uneasy peace.

Our first consideration should be development of our oil resources at home for our national defense and for our industrial security in the future. That, to me, is axiomatic, but I do not say that our American citizens who are interested in developing oil in Arabia should now fold up their tents like the Arab in the night and steal back to the United States.

The rights and interests of our American nationals in the Middle East, as well as in every other part of the world, should be backed and protected by our Government. It would be folly for us to check-rein initiative and enterprise of our American citizens. We should foster and encourage enterprising American businessmen in going after foreign trade. We must have an expanding foreign trade if we are to dispose of our surpluses from farm and factory. We must be world-minded and appreciate that with the advent of faster communication by airplane and other means it is stupid to think that we are isolated by the Atlantic and Pacific Oceans.

When the steel needs of our domestic oil industry are adequately supplied, I see no reason why steel should be withheld from development of oil fields in Arabia

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or elsewhere by enterprising American nationals. The hazards in the Middle East may be greater than other places but there are few spots outside the Western Hemisphere where hazards do not exist.

Certainly we should not halt our business enterprises abroad simply because they happen to be close to Russia's border. If we were to adopt such an ostrich-like policy—a policy of fear—we would be playing into Soviet Russia's propaganda game.

By the same reasoning we would have to stop pouring our wealth and goods and know-how into other lands adjacent to Russia for development of a myriad of industries.

I believe that we should aid freedom-loving countries but we must be prudent about it and not dissipate our own resources and neglect the development and expansion of our oil production and everything else that contributes to make a nation strong. Our energies should be directed toward discovery and development of the fullest possible volume of crude oil reserves. America's defense problems obviously would be vastly simplified if its dependable oil reserves were contained in the Western Hemisphere, protected against confiscation and sudden destruction.

Since the end of the war, the oil industry has discovered tremendous new United States petroleum resources. Discovery of undeveloped fields, however—and undiscovered oil—provide no quickly accessible supply in case of emergency. For true security there must be a continuous program of drilling. This is possible only if the domestic oil industry has the materials with which to drill and is allowed to supply the United States market with its oil.

The American oil industry is entitled to protection against destructive foreign competition. Only if the oil industry can sell and use its crude oil can it afford to finance and develop new resources. It is like farming or any other business. If the American farmer cannot sell his wheat he will stop planting it.

The Senate Special Committee investigating petroleum resources, in January, 1947, made these observations:

"This nation now faces two alternatives," it said, "either (1) to await with hope the discovery of sufficient petroleum within our boundaries that the military requirements of the future will occasion no concern, and in the meantime to depend upon foreign oil and trust that a war will not cut off our imports; or (2) to take steps to guarantee a domestic petroleum supply adequate for all eventualities by means of (a) incentives to promote the search for new deposits of petroleum within the boundaries of the United States and in the continental shelf; and (b) the continuation of the present program looking to the manufacture of synthetic liquid fuels to supplement our domestic crude supply. All the facts before us impel the choice of the second alternative."

The United States last year reached the highest peak of crude oil production in its history, and yet these increases barely meet domestic requirements which are constantly mounting. It is imperative that the United States continue expansion of its oil productivity until we have an excess of capacity equal to what it was in 1941. That was the year the United States entered World War II. It is estimated that would mean a margin of at least a million barrels a day between actual producing rate and the maximum efficient rate of production. These development goals cannot be attained if they are confronted by price destroying imports and competition in world markets on a scale far greater than pre-war.

The American people have a vivid memory of gasoline rationing during the war years. Let's prepare against such a contingency in the future.

The whole subject of oil supplies is of tremendous importance. It is vital to our national defense; it is vital to the future growth of our country; it is the life blood of our aviation for peace and in preparedness for national defense. It is a problem that should be thoroughly explored by Government and by industries, especially the aviation industry.

The fate of our nation may depend upon oil. Let's not fumble with fate. END

Biggest Problem

(*Continued from page* 17)

on the utility of the lightplane is the greatest need.

Interests of groups as varied as Government, fixed-base operators, pilots and manufacturers are certain to be opposed in many instances. What is surprising, therefore, is that spokesmen of the first three groups are in virtual agreement with each other, and in disagreement with the manufacturers.

Operators want planes with greater utility and lower cost because they are not making money with the planes they have.

Pilots know the limitations of their present planes, and they have been told for years that the ideal lightplane is just around the corner.

Government, by nature committed to an expansionist philosophy, believes civil aviation's growth is being impeded by lack of lightplane utility.

So the manufacturer gets it in the neck from these groups. The plane-builder, however, explaining his failure to produce the "universal vehicle," has a logical answer. Under present conditions he is financially unable to engage in exhaustive research on such a plane.

T. Claude Ryan, president of the Ryan Aeronautical Company, gets to the root of the problem when he points out that manufacturers are utterly unable to afford the research necessary to produce a revolutionary new-type plane. Airplane builders, who have little surplus cash at best, cannot today recover the high costs of applied research, experimental and design work on personal planes that would provide the rate of progress known to be possible.

Government Financing

He believes that Government aid is the answer to this problem. "We must in the future have better and more advanced designs in the personal type planes such as are adaptable to 'off-the-shelf' procurement for many uses by the military. Perhaps this is an indication of where some form of Federal support may be justified as a relatively low cost national security investment."

Here, then, is cure No. 1—Government aid to finance lightplane development. But Ryan stands almost alone among personal aircraft manufacturers in favoring any such program. In the past, the Personal Aircraft Council of the Aircraft Industries Association, supported by its member manufacturers, has opposed development grants which the CAA would administer.

Education

Don Flower, sales manager of Cessna, feels that the present 500,000 pilots are a broad base for future growth. He believes that aviation is suffering because even these pilots don't think of the airplane as a cross-country vehicle. Such a program, of course, would involve an educational campaign to sell cross-country flying. It would be an extension of the sort of thing FLYING does in urging pilots to take "flying holidays."

John P. Gaty, vice president and general manager of Beech, takes somewhat the same tack. He believes that the public doesn't realize just how great a contribution to business efficiency a modern airplane can make. W. T. Piper, president of Piper, also emphasizes the need for education. "I think a good answer would be to put more emphasis on getting people into the air, if only for a short ride," Piper says.

Cure No. 2: Education.

More Airports

Joseph T. Geuting, manager of the Personal Aircraft Council of the Aircraft Industries Association, lists adequate facilities as one important answer to giving planes more utility. Robert McCulloch, president of Temco, and John A. Lawler, president of Aeronca, also believe that lack of adequate airports and services are private flying's biggest problem.

Cure No. 3: More airports.

Joe Geuting says, "We have found that today's aircraft appeals to and serves the needs not only of personal pilots but also those engaged in agriculture and business." John Gaty says it even more emphatically. "The state of the development of the post-war private airplane is adequate; the facilities for its use are adequate; and the level of skill of the available pilots is adequate."

This is an almost universal view of the manufacturers. They are pleased with their airplanes. They seem to be fairly well content to accept the market for these airplanes as it is, and with that particular share of the market that they can gain through legitimate competition. They want to work within the present framework of aviation and airplanes, allowing for the gradual evolutionary increase in

facilities, interest and engineering improvements.

More Utility

The other groups generally speaking are not satisfied with things as they are, and especially not with the airplane.

Del W. Rentzel, Administrator of Civil Aeronautics, is one of half a dozen who hold that lack of utility is private flying's greatest problem. He believes the problem could be solved by a plane capable of landing and taking off in a space of about two acres regardless of wind direction, and able to fly and land under complete control slower than 25 m.p.h.

Hugh L. Dryden, director of aeronautical research for NACA, agrees that slower landing and take-off speeds without undue penalty on cruising speeds would be important.

Dean R. Brimhall, administrator for research, CAA, differs in detail and takes the most critical view of the three Government spokesmen commenting on this subject. "More and better ground facilities and improvements in the present plane will help considerably, but these are not enough," Brimhall says. "What is more important is a dual purpose plane that can be used on short every-day trips as well as in long-distance flying."

Operators' spokesmen emphasize utility and expense. James W. Batchelor, general counsel of the United Pilots and Mechanics Association, believes lack of money is the biggest single problem, but he holds that Government rules and red tape, and "inherent lack of utility of personal type aircraft" also hinder private flying.

Harry Meixell, executive director of the National Aviation Trades Association, mentions both utility and cost. Wayne Weishaar, secretary of the Aeronautical Training Society, likewise feels it is cost plus utility. "Private flying's biggest problem," he says, "is getting where you want to go when you want to go at a price the man of good average income can afford to pay."

The pilots' spokesmen also tend to agree on the need for more utility. Lynn Bollinger, executive director of the Aeronautical Research Foundation, wants a plane that will fly safely at ultra-slow speeds, permitting it to land on a tiny strip—yet cruise over 100 m.p.h. "The problem is the inadequacy of the airplane itself," Bollinger says.

Jerome Lederer, director of the Flight Safety Foundation, also complains about lack of utility. So does Lloyd Child, executive secretary of the Non-Scheduled Flying Advisory Committee, and A. B. McMullen, executive secretary of the National Association of State Aviation Officials. Forrest Watson, president of the National Flying Farmers, said shortly before his death in April, that it's mainly an airport problem.

Cure No. 4: More utility.

It remains for J. B. Hartranft, Jr., general manager of AOPA, to challenge the manufacturers directly. "Instead of that much-used phrase, 'let the customer beware,' private flying needs a 1949 version: 'let the seller beware,'" he says.

Hartranft and the other critics of airplanes as they are today refer to the example of the automobile industry as a model for aviation to follow. They are disappointed because the aircraft manufacturing industry has not become a second automobile industry.

The pilots, operators, and Government officials are disappointed because they don't have an airplane now capable of satisfying a sales market of millions. The manufacturers, who would be even more delighted than their critics if they had such a market, frankly don't know how to design or to build a plane to meet it. And they doubt that the pilots and operators do. Even if the manufacturers had the know-how, there is some question that they could finance the necessary development work. Their case, however, is not made stronger by the fact that they have opposed CAA development funds working toward such an end.

It is probably a fair guess that the manufacturers don't believe such an airplane is possible—at least today. On whether it is, however, depends whether the aviation business will remain a fairly small industry of steady but slow growth, or whether it is to become, as the dreamers assure us, a second automotive industry.

That alone may or may not be private flying's biggest problem, but it is certainly a matter for the future. CURTIS FULLER.

Revolutionary Lightplane?

(*Continued from page* 30)

Meanwhile, Prof. Otto Koppen who designed his first lightplane for Ford in 1925 and who designed the pre-war General *Skyfarer*, had evolved a simple yet ingenious "invention" which starts with well-known and proven devices uniquely combined to produce unheard of performance and safety.

One major combination, for instance, slotted flaps and leading edge slats, had been well-proven in the past but also had drawbacks. They could get planes into small fields but their drag was so high they took off as poorly as, or poorer than, conventional planes.

Koppen's design includes a new propeller arrangement that produces extraordinary high thrust at low speeds and is so proportioned that planes which use his combination of propeller and high lift devices are able to climb out of a very small field as easily as they can land. Koppen thus found that he could take a conventional size airplane, and with the same wing area, payload, power loading and cruising speed could produce a plane of sensational small field performance.

Bollinger and Koppen teamed up. They first took their project to T. P. Wright, then head of CAA, who was intensely interested in lightplane development. Wright tried unsuccessfully to have manufacturers approve a general development program for lightplanes but the industry rejected his proposals. Since no development money was forthcoming from CAA, the two men then discussed their project with NACA officials who advised them that it was out of the province of that body.

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They took their design to a prominent lightplane manufacturer and offered to modify an existing production model, stipulating only that the manufacturer should repay the costs plus a small royalty if the modification succeeded and if the manufacturer then decided to build planes incorporating the new devices. The manufacturer, however, considered his present plane good enough for today's markets.

It wouldn't have taken much retooling —especially for a fabric-covered plane. What was the matter?

Apparently it was fear of pioneering. The manufacturer conceded that the new arrangement would probably work but seemed to feel that anyone who pioneered it would risk losing his shirt.

Koppen and Bollinger were returning to Boston last summer after a baffling turn-down. They decided not to "shop" any further. They asked themselves, "Do we believe in this thing, or don't we?"

They agreed that they did and they decided to dig into their own pockets and build a demonstration plane themselves.

They were particularly encouraged by high-ranking Air Force officers. Moreover, several major manufacturers of military aircraft somehow got wind of the development and began to ask about licensing possibilities—when and if the design were proved practical in flight tests.

Soon Bollinger and Koppen had a conference with a policy committee of 12 National Aeronautic Trades Association members. These experienced operators were asked whether they really believed they could build a successful fixed-base business with today's airplanes. Their answer was no. Koppen and Bollinger then described the performance that might be made possible by their design. Could the operators build a successful fixed-base business with such an airplane? The answer was unanimously yes. Koppen and Bollinger had their answer.

They set to work to build their airplane. At first they thought they would modify a conventional plane but after a careful analysis of control problems in slow speed flight decided to start from the beginning. They used a cabin section from a conventional high-wing fabric-covered airplane and built around it a new fuselage and wings.

Construction was begun late in 1948 and the *Helioplane* rapidly took shape in the Boston shops of E. W. Wiggins Airways. As late as February 1, 1949, the engine had not been installed nor had the frame been covered. By March it was ready to fly. Progress on the job was aided immeasurably by the enthusiastic interest of Joseph Garside, Wiggins' president, who even worked on the plane himself.

The frame is fairly conventional but shows unusually careful engineering in detail design. The *Helioplane* uses a conventional high-lift airfoil section with a slotted full-span flap and leading edge slat. The slats are automatically retractable. They retract when the plane has attained cruising speed and extend when it slows for a landing.

Koppen and Bollinger wanted to build an airplane that was both simple to operate and safe to fly. They use a fuel injector. To avoid possible pilot error in propeller control, they chose a constant speed Aeromatic hub as part of the specially designed, high-thrust propeller arrangement. The flaps work by a crank and screw mechanism in the cockpit. They can't be dumped suddenly. No gasoline cut-off is required since the tank cannot leak through the carburetor while parked. A chest strap is standard equipment. It would be quite possible for a pilot to fly this plane directly into a rigid obstacle—or the ground—at normal approach speed and walk away unhurt.

The *Helioplane* could have been built more cheaply and rapidly without the automatic slats and could still have been flown under 30 m.p.h.—leaving it to the pilots' skill to avoid low altitude stalls. The slats do not decrease the speed or improve the climb but simply make it possible to use this full performance range with safety.

As experienced pilots know, many light airplanes have a minimum (stalling) speed of not much over 40 m.p.h.—but when that speed is touched the airplane "sells out." In practice, few lightplane pilots dare approach or leave the landing area with flying speeds of much less than 60 m.p.h., and the novice pilot commonly uses a higher speed for a more assured margin of control. Thus a singular feature of the *Helioplane* design is that its minimum speed of 27 m.p.h. is actually usable in flight with safety.

The *Helioplane* will be especially safe in bad weather. A pilot lost in the overcast can throttle back to 30 m.p.h. and—needing only a bank-and-turn indicator for guidance—he can descend slowly without risk of personal injury. In event of engine failure, even in overcast, the pilot can simply set his flaps, and coast slowly to the ground.

If the ceiling suddenly goes almost to the ground during a low altitude under-the-weather flight—a common cause of cross country accidents—the plane's turning radius is so small that the pilot ought not to find himself in trouble. This is a real answer to bad weather flying for the novice. For the first time he can fly low and slow with confidence.

Koppen and Bollinger are the first to admit that one *Helioplane* isn't going to prove much. Moreover, they warn their friends not to be alarmed if the first prototype should be broken up in an effort to test-to-destruction various critical component parts that are being purposely strained far beyond normal flight limits.

Before any *Helioplanes* are offered publicly, they hope to obtain a test order for a small number from the armed services or from a few industrial users—and possibly from a very few selected individuals (probably confined to the vicinity of Boston). They want the craft to have a thorough service testing under controlled and carefully observed conditions before it is offered to the general public. They won't release it for manufacture before it is absolutely right.

When will that be? Frankly, they don't know, but they hope such aircraft will be available to the flying public next year. They have recently offered certain *Helioplane* design rights to a prominent manufacturer of military and commercial aircraft. They are not, however, granting any exclusive privileges which would interfere with their intent to license interested manufacturers of personal aircraft.

Helio Corporation, which is the incorporated name of their present experimental enterprise, does not intend to go beyond limited production of a test quantity, explains Bollinger, who is serving as chairman. "Since at least one established manufacturer has already indicated a desire to use the *Helioplane* design idea, our team should be able to confine itself to the role of research and development."

What will such an unusual aircraft cost? Koppen and Bollinger say:

"At equal volume with present lightplanes similarly equipped with variable pitch propeller and crosswind gear, the cost should be only a few hundred dollars more. With increasing volume, productions costs can be cut sharply—so, if the *Helioplane* meets a real demand, its selling price should soon be well under that of today's fully equipped lightplane."

As far as Bollinger is concerned, unless the *Helioplane* can be sold in greater numbers than conventional planes it's no good commercially—though it may still serve valuable military purposes. As a marketing expert, he's interested in mass sales. Bollinger and Koppen are determined to do their best to bring them about. END

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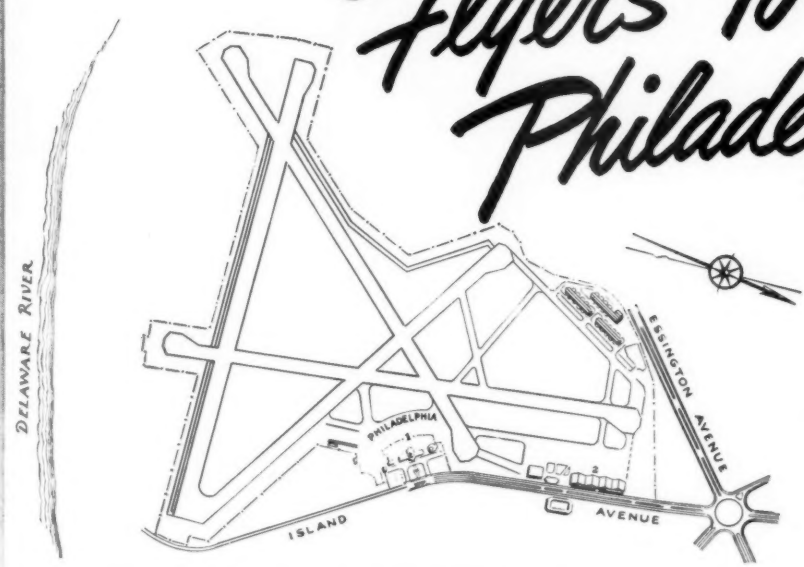

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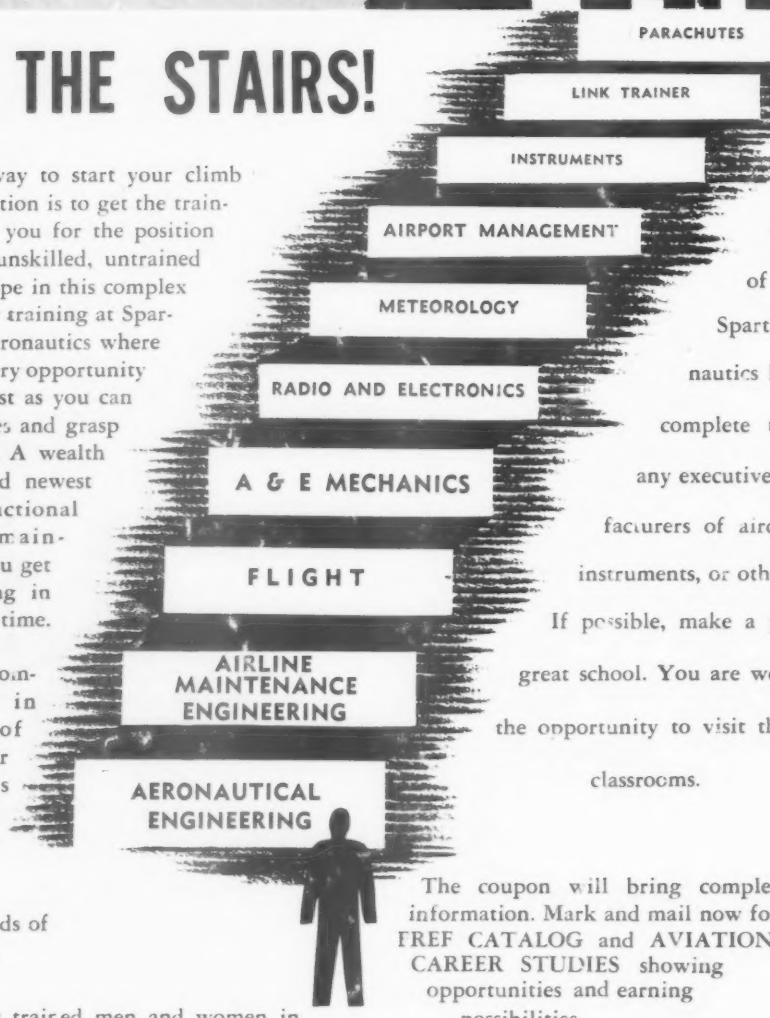

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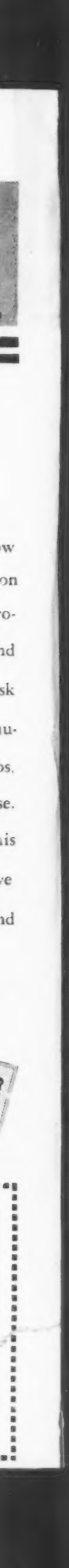
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